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Electrical News

Generation, Transmission and Application of Electricity

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International Fair at Lyons an Opportunity for Continental Trade Openings

On March 1st, 1919, the fourth International Fair to be held at Lyons, France, will be opened and will remain open for two weeks. This fair was organized during the war primarily to give impetus to French commerce. Its development during the four years it has been in existence has been phenomenal and it will probably replace the world-famed annual fair, which, before the war, was held at Leipsig, Germany. Mr. W. M. Clarke, Canadian Trade Commissioner at Milan, Italy, states that the fair is not a place where merchants assemble their products and sell them to visitors, but it is a sample show where producers and buyers meet and from samples shown important purchases are made, delivery of which is made direct from the seller on conditions that vary as regards time and place.

At the 1916 fair, there were 1,342 exhibitors and business amounting to $10,400,000 was transacted. In 1917, there were 2,593 exhibitors and business valued at $82,000,000 resulted. In 1918, there were 3,176 exhibitors who did business amounting to $150,000,000.

It is worthy of note that of the 543 exhibitors from the United States in 1918, 405 displayed catalogues and price lists only, orders being placed under the direction of the American Consul-General at Lyons. Nevertheless, it is reported that the business transacted by United States firms formed a very important part of the total sales.

The Canadian Minister of Trade and Commerce has applied for thirty booths at the next fair. A few of these will be used for Government exhibits, but most of the booths have been placed at the disposal of the Canadian Manufacturers' Association for allotment, and application for space should be made to that Association. The Department will pay for the booths and also the freight on exhibits from the port of embarkation to Lyons.

This is an excellent opportunity for Canada to display what she can furnish to help re-build war-wasted France and at the same time improve our national financial standing. Canadian manufacturers should co-operate with the Department of Trade and Commerce to "get the business."

Hamilton Radial Wants Higher Rates

The Hamilton Radial Railway Company, a subsidiary of the Dominion Power and Transmission Company, operating between Hamilton and Oakville, discontinued service on December 13 beyond Burlington Beach, two and a half miles away from the town of Burlington. The company issued a statement some time ago that, to enable them to continue operating without loss, it would be necessary to secure an increase of approximately 50 per cent. in revenue. The Dominion Railway Board, after hearing the case of the town of Burlington, ordered the Hamilton Radial Company to provide an adequate service under the terms of the agreement, by which they secured right-of-way through the town. This order, however, the company finds itself unable to carry out. The whole matter seems to hinge on the failure of the municipalities to understand why the Radial Company should seek to break agreements made, apparently, in good faith. They have not taken into consideration that rates computed in normal times are totally inadequate owing to the present high operating cost. Sir Henry Drayton advised a course of action whereby the municipalities agree to an adoption of the company's proposed scale of rates, but for some limited period—say two years, at the end of which time the original by-laws and agreements would become fully effective again. The intervening time would allow for a complete investigation into the company's operating expenses and there would then be no uncertainty as to the proper course of action. At the time of going to press the matter is still undecided and the company's lines idle, the towns affected being Burlington, Pine Grove, Bronte and Oakville.

The Toronto "World" is particularly incensed that the Hamilton Radial Railway Company seek to increase their fares by about 50 per cent. The "World" forgets to mention however, that the same conditions made necessary an increase in the price of the "World" of just 100 per cent.

Montreal Electrical Luncheon

Mr. A. R. McMaster, K.C., M.P., spoke on the League of Nations, at the Montreal Electrical Luncheon, on December 11. He is a strong believer in the league, and dealt with its objects, the difficulties in the way of its formation, and the grounds for hopes of success if formed. In a singularly clear, well reasoned address, Mr. McMaster traced the recent steps taken in the States to promote the formation of the league—a league to enforce peace, so that a nation should not issue an ultimatum or mobilize troops before placing the questions at issue before an international tribunal. The greatest difficulty was as to whether Germany, notwithstanding her very black record, should be included.

After quoting many British statesmen in favor of her inclusion, Mr. McMaster argued that Germany would be a greater danger if excluded than if she were included, for the

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reason that outside Germany would be able to take advantage of any dissension between the other nations, and differences of opinion would inevitably arise. But if Germany was to be included, it must be a repentant, democratic Germany, willing to show the way down the hill in the matter of armaments. In his opinion, the trial of the Kaiser before an international court would clarify the situation. Another difficulty was the national pride of the nations. The idea that a nation would be willing to cut down its armaments and also abandon the right to make war until the questions at issue had been placed before an international court was against national pride. In his view, the great hope for success of the league was founded on the terrible destruction wrought by the war and the chaotic conditions which now existed among the Central Powers.

The Electric Club of Toronto

Before the Electric Club of Toronto on December 20, Dr. C. D. Howe, Associate Professor of Forestry in the University of Toronto, gave a most interesting address on the subject "The Forests of Canada." The speaker endeavored to remove the false impression which he believed was held by the majority of Canadians, that our timber resources are practically inexhaustible, pointing out that the total area of timber land was only in the neighborhood of 400,000 square miles, of which probably one-half had been destroyed at one time or another by fires. It was pointed out that one fire does not necessarily entirely destroy a forest, but that subsequent fires gradually destroy the possibility of these forests, re-seeding themselves and that inasmuch as we had taken very little trouble to prevent the recurrence of fires, most of this area that had been burned over had failed to recover and so was a total loss.

The professor pointed out that much of the cost of destructive forest fires could be placed at the door of those who were responsible for the appointment of the men in charge of the fire fighting organizations. These men for the most part were inefficient and only held their positions as a result of government influence.

The condition with regard to the number of years required to re-forest with the various types of trees, the susceptibility of many trees to disease, and other conditions which up to the present time have not been studied to any extent, were outlined by Dr. Howe. He concluded with the hope that in the near future he would be able to address the Electric Club again and explain that steps had been taken to remedy many of the evils at present existing and which were destroying one of the most important of Canada's heritages.

The first meeting of the New Year will be held on January 10.

Lignite to be Ready in 1920

The Lignite Utilization Board, composed of Mr. R. A. Ross, consulting engineer, Montreal; Hon. J. A. Sheppard, Moosejaw; and Mr. J. M. Leamy, provincial electrical engineer for Manitoba, has reported to the Council for Scientific and Industrial Research that there is a vast quantity of preliminary work to be disposed of before there can be any actual commercial output of briquetted lignite from the projected demonstration plant in Saskatchewan. Before proceeding with the purchase of machinery and the construction of the plant the Board estimates that six to eight months will be devoted to an exhaustive study of carbonizing and briquetting methods; six months will then be required for arranging plant lay-out and purchasing machinery, and six more months for commercial adjustment and initial operating stages. By the spring of 1920, therefore, it is anticipated the plant will be in full operation.

Wonderful British Naval Construction — One Destroyer a Week Since August 1914

The public knew from the various speeches delivered by Sir Eric Geddes and his predecessors at the Admiralty that very considerable additions have been made to the floating strength of the British Navy since the outbreak of war, but for obvious reasons little or nothing of a definite nature could be published in regard to this subject. Even now, when the ban on such publicity has been entirely removed, an appreciable period must elapse before it will be possible to describe in detail the process by which the British Navy has, in the past four years, attained a degree of strength such as it never previously enjoyed. Notwithstanding war losses, which have been far from light, the Navy to-day is considerably stronger, both relatively and absolutely, than it was in 1914. The heaviest losses have been suffered by types which were already regarded as obsolete, e.g., pre-Dreadnought battleships and armoured cruisers, and which, in consequence, did not call for replacement. Among the first-line capital ships our losses have been surprisingly light, considering the number of these vessels and the hazards they were compelled to run. Of the all-big-gun battleships, only two have been officially posted as sunk—the Audacious, destroyed by an internal explosion in July, 1917. In addition, three battle-cruisers, the Queen Mary, Indefatigable, and Invincible, have disappeared from the list, all three being sunk at the Battle of Jutland. New construction, however, has proceeded on such a large scale that, besides replacing these five vessels, we have an addition of five capital ships to the Grand Fleet.

Almost immediately after the outbreak of hostilities it was realized by those in authority that the naval campaign would be of such a character as to necessitate the employment of special types of fighting craft in which the Navy was conspicuously weak. In the past our naval construction policy had been based on the supposition that the command of the sea depended, in the first instance, on the numerical and individual superiority of our capital ships. The principle was perfectly sound, and has, indeed, been abundantly vindicated in the course of the war, but in the opinion of some judges it was pushed rather to an extreme length in pre-war days. At all events, it is quite certain that our early operations were handicapped by the shortage of light cruisers, destroyers, and certain special types which had not been multiplied on a scale commensurate with the expansion of the battle fleet proper. Even before the submarine menace made its appearance, the demand for destroyers was greatly in excess of the material available; and when in due course the submarine danger became acute, steps were at once taken to accelerate the output of destroyers by every possible means. The time has not yet come to subject our naval policy since 1914 to a searching investigation, but it is permissible to observe that the Admiralty's decision to lay down a number of heavy battle-cruisers, monitors, sloops, etc., at a period when destroyers were the crying need, has been severely censured by critics of unquestionable authority. These larger vessels monopolized a great deal of labor, plant, and material, with the result that for some time the production of destroyers was seriously retarded. At a later date this policy was modified, and, on the whole, the output of naval material during the war has been eminently satisfactory. The private shipyards throughout the United Kingdom have in every case proved worthy of their great traditions. Although rapidity of construction was the prime need, the high standard of workmanship characteristic of these establishments was well maintained, and it is safe to say that the workmanship of the vessels launched during the war has left nothing to be desired.

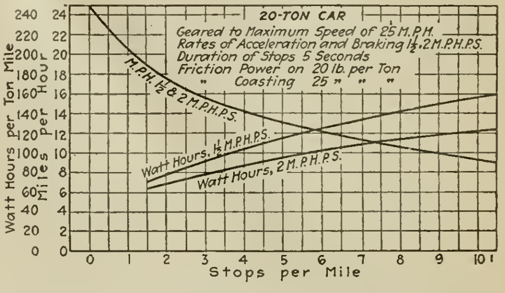
The naval material completed since July, 1914, may be summarized as follows, the figures, though approximately correct, being quite unofficial: Eight battleships, five battle-cruisers, twenty light cruisers, 148 mine-sweeping sloops, sixteen large monitors, nineteen small and twenty-three river monitors, 190 destroyers and over 100 submarines. To the foregoing must be added many auxiliary craft, including whalers, "P" boats, large oil tankers, and 500 motor launches, the latter mainly of American construction. From the technical point of view, perhaps the most interesting, because the most novel, naval types built during the war are the so-called "hush hush" cruisers, a bold attempt to combine extraordinary speed with great gun power. We shall await with interest the revelations of how these mighty cruisers have acquitted themselves in service, and whether they have proved sufficiently useful to justify their high cost, not only in money, but in labor and material, at a time when both factors were almost priceless. As we pointed out last year, when M. Tardieu, a French naval critic, was allowed to publish a general description of their features, these ships complete a cycle of naval architecture which began forty years ago with the launch of the Italia and the Lepanto, when Italian constructors set the pace in the building of relatively huge vessels, with high speed, powerful armament, and moderate protection. As an indication of British shipbuilding and marine engineering capacity, the statistics relating to destroyers are very suggestive. Roughly speaking, we have completed one destroyer a week since August, 1914, in addition, be it noted, to a large programme of other construction, including nearly 150 sloops, numerous cruisers, monitors, submarines and auxiliaries, to say nothing of the mercantile production, which, despite the critics, has been very far from negligible. The magnitude of this shipbuilding achievement is enhanced by the fact that a modern destroyer is rarely less than a thousand tons in displacement, and has a speed of more—in some cases of far more—than thirty knots. The British shipyards and marine engineering ships have every reason to be proud of their war record. Hitherto, the public has necessarily been debarred by the censorship from learning what these allied industries have done to maintain that naval supremacy to which, in the main, we owe the triumph of our cause. Now that the restriction on publicity is at end, it is fitting that their incomparable services should be made known and worthily acknowledged.—The Engineer.

Economies Produced by Skip-Stop Service

A report has been prepared by the United States Fuel Administration, setting forth facts as to the real economies produced by operating cars on the skip-stop system.

Skip-stop service involves a reduction in the number of stops made, and theoretically there should be saved the amount of time previously lost in the stops thus eliminated. If, however the schedules are not revised to compensate for the eliminated stops there will be a natural tendency for the motorman to accelerate and brake his car more slowly than before, and both motorman and conductor will tend to permit the stops to be extended in length. In order to get the full advantages of the skip-stop plan, therefore, car operators should use the maximum rates of acceleration and braking with the minimum duration of stop which are possible with due regard for the comfort and safety of the passengers. Time saved in reducing the accelerating, braking and stop periods can be utilized in increasing the schedule speed, or it can be added to the coasting interval, or it can be divided, part being used for each. To demonstrate the relation between schedule speed, energy consumption and stops per mile the accompanying curves have been prepared covering two rates of acceleration and braking. These curves are based upon data for a 20-ton car geared for a maximum running speed of 25 m.p.h. Acceleration and braking rates are assumed first as 1½ and then at 2 m.p.h.p.s., and the car is assumed to be operated at maximum schedule speed with five-second stops. The friction with power on is taken at 20 lb. per ton and for coasting at 25 lb.

When the car is accelerated and retarded at the lower rate the energy consumption is greater than when the higher rate is used. From the curves the following table has been prepared to show the relation of values in the two cases:



CURVES SHOWING RELATION OF SPEED, ENERGY CONSUMPTION AND STOPS PER MILE AT TWO RATES OF ACCELERATION AND BRAKING

Stops per mile	Watt-hours per ton mile 1½ M.p.h.p.s.	Watt-hours per ton mile 2 M.p.h.p.s.	Ratio in per cent.
3	92	78	84.5
5	114	95	83.
7	134	108	80.6
9	150	118	78.7

The reason for the smaller energy consumption with the higher rate of acceleration and braking is that the motorman operates for less time on the resistance points of the controller. There is also less energy dissipated in the brake-shoes as well as in the resistors.

It is suggested that all railways might advantageously post in conspicuous places, where they will be seen by train crews and company officials, statements of the total amounts of energy used during the preceding week, with the car mileages and energy consumptions per car-mile, and with comparisons of past records to permit the checking up of the effect of the instructions issued to train crews and others. Some railway systems have their power lines sufficiently subdivided as to make records available for individual lines and thus to permit records to be compared. Comparison between divisions will usually result in personal and divisional rivalry.

The practice of checking operators as to rate of acceleration and braking used, and as to their success in reducing duration of stops to the minimum, cannot be too strongly advocated. The most systematic way of doing this is with the aid of some form of checking instrument. Verbal instructions, printed rules and other educational work require a relatively large amount of effort and do not accomplish the results which can be obtained with the aid of some such device. It is reported that 98 per cent. of the cars in Great Britain have for the past fifteen years been using some form of checking device. In America we probably use instruments of this character on fewer than 70 per cent. of our cars. Records show that by using these devices, with proper follow-up systems, it is possible to save at least 15 per cent. of the power consumption. Theoretical savings are from 20 to 25 per cent., but in actual practice somewhat less is expected.

The Relation Between Light Curtailment and Accidents

By Mr. R. E. Simpson*

From the published statistics of a number of states, together with conservative estimates for the remainder, we find that approximately 25,000 persons are killed or permanently disabled, 500,000 seriously injured, and 1,000,000 slightly injured, each year. Translating these figures by means of the accident severity rates we have a total of 180,000,000 days of lost time. This is equivalent to the loss of the services of 600,000 men for a full year of 300 working days. The economic loss is distributed over the entire country during a period of one year, and for that reason its effects are not so keenly felt, or its importance recognized. If, however, this loss were concentrated on any one of our basic war industries, as for example, shipbuilding, steel making, munition manufacture, or coal mining, it would be nothing short of a national calamity. Even distributing this loss among the four industries named would seriously cripple all of them.

It is apparent that we have here an important factor touching on the supply of labor, and anything that can be done to curtail this economic loss is worthy of careful consideration. There is a certain percentage of unavoidable accidents—that is, man's provision is unable to cope with unknown factors, and this is especially true of pioneer work. The best that can be done is to profit by experience, and endeavor to prevent the knowledge and experience thus gained from lagging behind practice. A large percentage of accidents may be classed as avoidable in the sense that the application of mechanical safeguards and the observance of safety rules will prevent them. Anything in the form of a practicable guard, of safety education, or of safety regulations that will protect the worker from injury should be welcomed by the plant manager to-day. Past investigations have indicated various influences on the causation of accident, and prominent among these is industrial lighting.

A survey of 91,000 accidents from the records of The Travelers Insurance Company for the year 1910 showed that 23.8 per cent. were due to improper or inadequate illumination. Bearing in mind the progress in the art of illumination during the past eight years, it is hardly possible that this percentage prevails to-day. New factories are lighted by up-to-date equipment, while many old plants have had their lighting systems brought into conformity with modern practice. These are steps in the right direction, and are bound to be reflected in the accident rate. Offsetting this, to a certain extent, is the practice of many plant managers of substituting high efficiency lamps, without providing adequate reflector protection. Notwithstanding the vast amount of expert advice that has appeared in the technical journals devoted to specific industries, there are literally thousands of plants that have not profited by this advice. The directing personnel of these plants, from managers to sub-foremen, do not seem to appreciate the difference between light and illumination, between a reflector and a wire guard.

18 Per Cent. of Accidents Due to Poor Lighting.

There is some foundation, however, for assuming that 18 per cent. of our industrial accidents are due to defects in the lighting installation. On that basis the services of 108,000 men for one year are lost annually, because the illumination provided is not adequate for the safety of the workers. That this condition should exist year after year is all the more reprehensible because of the fact that the remedy is so easily applied and has beneficial results in many ways other than in the element of safety involved. Accidents caused by carelessness, inattention, or ignorance can be eliminated only by a long continued, painstaking educational campaign often involving a change in long established habits. The elimination of accidents due to inadequate or improper lighting is simply a matter of purchasing approved equipment and installing it under competent direction. In fact, it seems proper to include illumination in the list of mechanical safeguards, for the reason that the lamps and reflectors provide the guard—illumination—to point out the hazard, just as effectively as a railing points out the danger of and provides protection against the hazard of a revolving flywheel. The sum involved is insignificant when compared with the accident claims, or the lost profit on the product of the labor, or the value of the product itself.

Many Improper Installations.

Anyone who makes an extended survey of the lighting conditions of our industries will inevitably be impressed by the much larger percentage of improper installations when compared with the inadequate installations. This is due primarily to the praiseworthy, but none-the-less ill-advised, attempts to better the plant illumination on the basis solely of providing a greater candlepower output. The questions of distribution, diffusion and absence of glare are either not fully appreciated, or are entirely unknown, and therefore do not receive proper consideration. Now if the persistent efforts of several years have not wholly succeeded in educating the factory managements in the fundamentals of good illumination, is it not absurd to expect intelligent application of hurriedly promulgated rules for light curtailment? This in itself should be a sufficient argument against any such action, and it is rather gratifying to learn that there will be no general request for diminishing industrial lighting.

The saving in coal by curtailment of industrial lighting would be negligible when compared with the ultimate economic loss. If, for example, the full year's labor of the 108,000 men that is lost annually, due to poor illumination, could be saved and applied to coal mining, 130,000,000 more tons of coal could be produced. To provide ample illumination for the safety of these workers, ten hours a day for a full year, would require less than 10,000 tons of coal. We may convert this fact into a more detailed and concrete form by saying that a 25-watt lamp burning ten hours a day will provide adequate illumination on a stairway for one year by the use of one-eighth of a ton of coal. By dispensing with the lamp one-eighth of a ton of coal will be saved, but if during the year one accident occurs involving the loss of only one day's time the economic loss from a coal producing standpoint would be sufficient to operate the lamp 32 years.

More Accidents on Dark Days.

This brings us up to the point of considering the effect of diminished lighting at places where such reduction is almost invariably found. Stairways, elevated gangways, passageways, and storage spaces are generally inadequately lighted, and are the first to suffer from a policy of light curtailment. The hazards associated with these poorly lighted sections of our industrial plants have been portrayed many times. Confirmation of these hazards has been given by the report of the British Government survey of industrial accidents showing that 40 per cent, more men are injured from falling and stumbling in the winter months than in the summer months. This is exclusive of street slipping accidents. The physical condition of the stairways and passageways is the same for both periods, the sole difference being in the illumination.

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*From a paper presented at the recent annual convention of the Illuminating Engineering Society.

Many accidents occur in storage places due to inadequate illumination, but this fact is not often brought out in the reports. Raw material and finished product are often piled in uneven tiers, and these fall over at inopportune moments. Carelessness is very often the contributing cause, but in many cases a conscientious worker will pile material unevenly simply because the illumination is not sufficient to show him that the tier is out of alignment. Similarly, in storing tools or small parts on shelves some are placed too near the edge and fall on the workmen. A case in point is that of a young man who was storing small diameter steel rods. Unnoticed by him, one of the rods protruded a foot or more beyond the edge of the shelf, and in passing this point later on he received a jagged cut along the side of his head. There was a small-sized lamp in the central aisle, but none in the side aisle where the accident occurred.

Badly Lighted Passageways.

Even the supposedly well lighted working spaces in some shops are not immune from accidents of this nature. A certain work bench was well illuminated by local lights with proper reflectors, but the bench cast a shadow on the floor while the general illumination was not sufficient to offset the shadow. There followed a sequence of accidents due to the toppling over of partly finished work piled in the shadow. With a higher intensity of general illumination, accidents of this type were largely eliminated. Passageways that are traversed infrequently hardly justify the continual use of an illuminant, unless there is exposure to moving machinery or other hazards. Irrespective of the danger element, all passageways should have lighting units so installed that they can be turned on and off at either end. The lack of such a provision was partly the cause of an accident to a carpenter who had been called in to make some repairs in a chemical establishment. A cup had been placed to catch the drip from a slight nitric acid leak until repairs could be effected. The carpenter, assuming that the cup was placed to catch oil drip poured some of the acid on his saw and then rubbed it with his hand. Before neutralizing agents could be applied the palm of his hand was badly burned. It is evident that if proper illumination had been provided the carpenter would have noted that neither the color nor the consistency of the acid corresponded to that of an oil that might appropriately be applied to a saw.

A method is open to plant managers by which, at the same time, coal will be saved, better illumination provided, and accident hazards reduced. It consists in the universal use of reflectors. Every plant manager (as part of his lighting policy) should adopt the principle of a proper reflector for every lamp. In the field of general illumination, the use of unshaded lamps, in connection with naturally dark walls and ceilings, or with white walls and ceilings that have become dirty, is not only wasteful and inefficient, but also increases the accident hazard from bright light sources. Proper reflectors would bring this wasted light under control, and at the same time reduce the accident hazard. In a limited number of cases smaller lamps could be substituted and still ample illumination would be provided; but for the most part reflectors should be used with the lamps now installed to bring about a much needed improvement.

In the field of local lighting there is much more room for saving and improvement. There are thousands of 120-watt carbon lamps, and many more thousands of 60-watt carbon lamps, used for local lighting about machines. It is the exception rather than the rule to find these lamps equipped with reflectors. Wire guards are more popular. For purposes of illumination a 15-watt or 25-watt tungsten-filament lamp with proper reflector would prove adequate. The question of serviceableness or of breakage of this lamp over the carbon lamp is dependent on local conditions. The recent agreement between lamp manufacturers and the Fuel Administration insures a reduction in the use of carbon lamps. In enforcing this policy, lamp users should be warned against employing tungsten-filament lamps without reflectors. Exposure to the high intrinsic brilliancy of the tungsten filament involves a greater degree of vision impairment than with the carbon lamp. Wire guards will not serve, for although they protect the lamp from breakage to a certain extent, they afford no protection to the eye. The lamp can be replaced for twenty-five cents, but the eye—vision—infinitely more valuable, cannot be replaced at any price.

During a recent inspection we noticed a workman at a stamping press who persistently stood at one side of his machine. In answer to our inquiries the workman stated that he could not see unless he moved to the side and closer to the lamp; and he also informed us that he was going to get a "big tungsten lamp." He was working on large tinned sheets and while standing in front of his machine a dazzling reflection was directed toward his eyes. A simple adjustment of his local light changed the angle of incident and reflected rays, and thus removed the trouble.

This incident is more or less typical. There is so much unintelligent use of light in the form of unshaded or improperly placed lamps that we are fast approaching the state of being a nation of eye-glass wearers. An important remedial step will be taken when we whole-heartedly get behind the movement of "a proper reflector for every lamp."

Discussion.

Chester C. Rausch, Assistant Director, The American Museum of Safety: There are two outstanding features concerned with the use of electric lights in illumination for the factory or other purposes. First, the almost universal tendency of those concerned in the maintenance of such equipment to allow it to become filthy with an accumulation of dust or smoke, particularly the reflectors; then when this condition has become intolerable, to attempt to relieve it by the addition of high candlepower lights or the removal of reflectors, or both. The eye-strain resulting from the exposure on any portion of the eye retina of the light from a modern high power nitrogen light is sufficient, in many instances, to cause momentary blindness when the eye is turned away from that source of light. Where such lamps are used in the vicinity of the point of operation of any machine, there exists the almost certain possibility that eventually an accident on that machine or device will result. The use of proper reflectors in such cases should be mandatory.

The loss of illumination due to the coating of reflectors with dirt may result in a loss of light equal to 60 per cent. or more, before attention is given to the fact that they need cleaning. The results where systematic cleaning of all reflectors and equipment has been followed, show a reduction in current consumption that, in many cases, has not only eliminated the need for additional installations of lamps, but has even reduced the necessity for using those already installed.

Many owners concerned with the maintenance of illuminating equipment complain that the cost of systematic cleaning is great, but such an argument can scarcely stand against the evidence repeatedly shown that accidents occur where illumination is poor on any one of the several points of quantity, intensity and diffusion. The proper installation of lighting equipment with reference to galleries, windows or other means of reaching the lamps, when fixed, or by the replacement of fixed lamps with those which may be lowered readily, disposes of this objection. That there is a direct relation between poor illumination and accidents is shown by a comparison of the number of accidents that occur during the course of the year when artificial light is used to supplement natural light in a portion of the working period, and where natural light is sufficient for all illuminating purposes. A 'Study of Accidents for the Year 1917" of the Portland Cement Association, shows the percentage of total accidents for twenty-four hours, ranging from as low as 7.3 per cent., between 12 and 1 p.m., to as high as 13 per cent., between 5 and 6 p. m., double. A similar frequency is also noted between the winter months; and the two, those for the hours of the day and for the months of the year, coincide almost exactly.

It takes only a casual observer without any technical training whatever to observe the enormous difference in the illuminating effect obtained in shops where the walls are kept smooth and clean and of light color, as against those where the opposite conditions prevail. One has but to recall his own experience in two rooms in his own home, in one of which everything is of light color, and in another of dark color; or of conditions that prevail when snow is on the ground, and when the ground is bare and bleak, to remember that even when it is supposed to be dark, the ability to get about is greater under the lighter conditions than under the dark.

When manufacturers and others whose places of employment or work require illumination learn that less light properly distributed through fixtures properly maintained costs less for current consumption, a long step will have been taken in the matter of illumination; but when, coupled to this, they can be convinced that the number of accidents is proportionately less, we will approach more nearly desirable illumination.

Less Than 5 Per Cent. Use Best Practice.

A. J. Sweet: Probably less than 5 per cent. of our industries represent in their lighting practice a close approximation to the best practice attainable in the present state of our knowledge. An additional 25 to 45 per cent. of our industries have made a good beginning toward providing adequate lighting, though their practice falls far short of the attainable ideal. The remaining one-half to two-thirds of our industries are characterized by grossly inadequate lighting.

It may be conservatively estimated that, in this year A. D. 1918, the application throughout American industry of our best present knowledge in the lighting field would result in a 15 per cent. increase in industrial production.

Consider what such an increase means. It is equivalent to the production of an army of approximately one and one-half million workers; an army that consumes neither food nor clothing nor wealth in any form; an army that produces without additional factory buildings or machinery or tools; an army that gives at least two-thirds its wages to be divided between capital and labor.

Moreover, such improved lighting means a material decrease in spoilage resulting from imperfections in workmanship. Such spoilage varies so enormously as between different industries and between different industrial operations that it is impossible to estimate its total in American industry with any degree of accuracy. It is safe to say that the decreased spoilage made possible by adequate lighting throughout American industry represents an annual net value of not less than $100,000,000. In terms of labor, this represents an army of not less than 100,000 men.

It should be emphatically pointed out that such "best lighting practice" involves a great deal more than the sufficient and proper quantity of light. It involves light of the proper quality, particularly with respect to diffusion. It especially involves the highly important consideration of the direction of the light rays with respect to the plane of the work. Sometimes the elimination of sharp shadows, sometimes the avoidance of such elimination, exercises an important influence upon the efficiency of industrial work. The proper screening of the light sources, to the end of attaining conditions under which eye fatigue is reduced to a minimum, is still another factor of large importance.

In short, the attainment of " best lighting practice" is a complex technical problem requiring for it fully adequate solution the services of the competent lighting specialist. The failure to recognize this is one of the factors retarding proper practice in the industrial lighting field. It is very difficult to convince the average industrial manager that he is not fully competent to decide his own best lighting practice, to solve his own lighting problems.

Staggered Hours of Closing

As a means of smoothing out the load curve, staggered hours for closing seem to offer very great promise. A recent investigation made in Boston showed that at least 15,000 kw. in generating capacity would be saved on the system of the Edison Electrical Illuminating Company if 30 industrial establishments would change their working hours by thirty minutes. This statement was made at a recent meeting of the Boston section of the A. I. E. E., by Mr. L. L. Elden, electrical superintendent of the company. Fifteen thousand kw. represents about one-sixth of the total estimated peak load of the Boston system for the coming winter, and the comparatively small change in closing hours required to realize such a large increase in available capacity is something of a surprise.

The Biggest Water Power Merger

The Niagara Falls Power Company, the Cliff Distributing Company, and the Hydraulic Power Company of Niagara Falls have been consolidated into a new corporation under the name of the Niagara Falls Power Company thus creating the largest electric power company in the world in point of energy output. Including the plant of its subsidiary, the Canadian Niagara Power Company, the company has an installed capacity of about 370,000 h.p. and is installing an additional 100,000 h.p., to be ready for operation during 1919, making it the largest and most important power installation in the world. It is proposed to substitute for one of its present 100,000-h.p. plants a new 200,000-h.p. plant.

The British Navy 99.99% Efficient

The statement was made on Trafalgar Day in London that the British Navy has carried, by means of its transports, 16,000,000 fighting men and the casualties amount to one man in every 10,000. The safety of the legions of overseas and American troops has rested with the Navy. That and the Mercantile Marine through their vigilance and efficiency have made the victories of the past years possible. They have fed and clothed the army in Saloniki and have kept England so well supplied with food and raw materials that no really serious lack has been felt.

Public Ownership the Obvious Policy for Electric Railways

By Richard McCullough*

The obvious remedy for the perils which now confront the electric railway industry is public ownership. It is the purpose here to analyze the situation and indicate the advantages of public ownership at present to both the public and the investor.

Old-Style Franchises are Valueless

In recent years one of the great difficulties has been to obtain franchises of sufficient duration to enable the companies to borrow necessary capital at the lowest rate of interest. As a matter of fact, under modern utility control, a franchise is merely a permit to lay tracks on certain public property, the service and equipment being determined from time to time by a commission. Nevertheless, franchises have heretofore been associated in the public mind with great value, and this impression persists. There has always been more or less opposition to new long-term franchises or extensions.

Under public ownership the necessity for franchises immediately disappears, and the rate up on which money may be borrowed, with the city's credit, would be much lower than that at which private corporations, with short-time franchises, could obtain the same money. The return which municipal authorities would claim on securities issued by them would be 2 or 3 per cent. lower than that demanded by private investors, and also much lower than the rate of return now termed reasonable by public service commissions. One of the greatest advantages to the community in public ownership lies in this lower rate upon borrowed money. The saving thus made in the fixed charges would be great enough to answer the claim frequently made that there might be losses due to wasteful and extravagant management under public ownership.

Service Question Would Be Solved.

Under public ownership the character of equipment and the kind of service can be deterimned by the people themselves. They can have exactly the service they wish to pay for. The familiar protests against the crowding of cars, antiquated equipment, infrequent service, restrictions of transfer privileges and poorer service than in other cities will then come back to the car riders themselves, and the remedy is obvious.

People can ride in discomfort or in luxury, according to the bill which they are willing to pay. It is entirely probable that under public ownership the community would be satisfied with the service simply because it was public service. They would feel that any necessary curtailment of service was for the common good and not for the benefit of the absentee landlord. Witness the absence of complaint regarding the steam railroad service now operated by the national government.

Under public ownership many reforms such as skip stops, train operation, staggered hours of business, short routing of cars, readjustment of routes, police co-operation in keeping tracks clear, and other aids to cheap and quick transportation, difficult to obtain under private ownership, would be immediately introduced.

One of the lessons taught us during our war experience has been the economic waste due to useless competition. The electric railway is the most economical intra-urban carrier, and under public ownership there would be no congested streets on account of jitneys, buses and other competitors. The private automobile owner might also be restricted in his now unquestioned right to use the city streets for storage purposes, if it was found that such use interfered with rapid transit on the city's street car lines.

Wage Adjustments Would be Simple

One of the most difficult problems, especially during the last year, has been the adjustment of wages. Whenever disagreements have arisen between electric railway employees and the companies, great pressure has been brought to bear on the companies by municipalities, merchants, chambers of commerce, and in some cases by the state and national governments to adjust wages so that there would be no cessation of work. The adjustment of wages has usually consisted in a horizontal increase far beyond the financial ability of the companies. Even where the authorities, readjusting the wages, have advised an increase in fare to compensate for this wage increase, it has been difficult for the companies to get the consent of the proper authorities. Contracts have been cited, legal obstacles raised and other difficulties put in the way of the companies.

Under public ownership, wages would be a simple matter to adjust. Precedents already exist in the wages of firemen and policemen. It is a well-known fact that the pay of street-car men at present is greater than that of the corresponding class of city employees. It is entirely possible that public ownership might lead to lower wages, and in a business where 50 per cent. of the operating expenses consist of wages, a lower wage scale would be an important factor in keeping down the cost of operation.

One of the frequent sources of contention between electric railways and municipalities has been the constant pressure brought upon the companies to extend lines into undeveloped portions of the city and adjoining territory. The usual argument advanced is that the extension will soon build up the new territory. Railways know from long experience that any extension increases the average length of haul, and that these extensions will probably be operated for many years at a loss before the territory is sufficiently well built up to produce enough riding to pay the expenses of operation.

This argument, however, does not appeal to the usual local improvement association or to the eloquent real estate promoter. Under public ownership, municipalities would have this matter entirely within their own control. They could build the proposed extension and make the car rider pay for it, or they could require a subsidy of the real estate owners sufficient to pay the cost of the extension in whole or in part, or for a term of years until the extension took care of itself.

The same methods could be used in connection with the building of rapid transit lines and terminal facilities, which are too expensive to be undertaken under private ownership. It is well known that the great gain due to rapid transit lines is in increased land values, which are reflected in the tax assessments and not in revenue to the railway. In case of public ownership the burden of building extensions and rapid transit facilities could be put where it belongs.

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Taxes and Fares Easily Adjustable

The question of taxes has always been a disputed point in connection with the operation of electric railways. Most companies feel that they are overtaxed, while often the general impression in the community is that they are not sufficiently taxed. Under public ownership the city or the state itself could adjust the tax question as it chose. It could either abolish special taxes and have lower rates of fare, or it could use the car riders to collect taxes and have higher fares.

This brings us to the question of rates of fare. It is difficult to see how electric railways, under private ownership, can ever afford to return to a 5-cent fare, even if their other burdens are lifted. But under public ownership the rate of fare could be established at 5 cents or less, and the deficit in the cost of operation made up out of the general taxes. Under an extension of this theory to the limit, street car riding could, if so desired, be made free, the cost of operation being spread over the entire community. This plan, I believe, was once proposed by Tom L. Johnson of Cleveland, who argued that inasmuch as the owner of a public office building provided free elevator service for his tenants, why should not a community provide free street car transportation for its inhabitants?

If the city chose the other alternative and used the street car system to assist in the collection of taxes, the rate of fare could be adjusted from time to time to produce the revenues required by the city, either in whole or in part. This would be an extremely simple method for the collection of municipal revenues and would reach many of the people who now pay no taxes at all.

The argument that has frequently been urged against public ownership of electric railways is the fact that the city would take over a large number of employees who might be developed into a political machine. All cities, however, now have more employees on their payrolls than they have electric railway operatives. All American cities have their own fire and police systems, employing much the same class of men as are now employed by electric railways. There has never been any great scandal over the use of firemen or policemen as a political machine. All the large American cities now operating their own water systems involving large investments and a large number of employees. The electric railway system, next to the water system, is probably the closest to the community and is vital to the health and happiness of the inhabitants of the city.

There has been a feeling that electric railway problems are so difficult and concern the welfare of each citizen so intimately, that no municipal administration could attempt to solve these problems with any prospect of re-election. We must not overlook, however, the large numbers and the powerful political influence of electric railway employees and their friends, who would no doubt rally valiantly to the aid of any administration which was fair in its treatment of them and which seriously attempted to solve present-day transportation problems, no matter how deeply the municipality might become involved in expensive experiments. We must not delude ourselves into imagining that public owners just like private owners can evade facing the demands for rapid transit, better equipment, denser service, a seat for every passenger and lower fares. Public owners must face these problems boldly, however, and in attacking them make use of their self-evident advantages.

Making Public Ownership Effective

With this brief statement of the advantages of public ownership from the standpoint of the people, the next question is how may it be put into effect. This may be done:

1. By any outright purchase of the electric railway system by the public at an agreed valuation.
2. By an assumption by the public of the securities of the railway, with an agreement to pay interest on these securities.
3. By an exchange of municipal or state bonds for electric railway bonds, and an agreement on the part of the public to pay an agreed return upon the stock.
4. By any combination of these three methods.

The first method, that of direct purchase, is the most simple and the most desirable from the standpoint of both parties. Investors, of course, will insist that if their property is taken over as a going concern, the public must not be niggardly in its treatment of the elements which unite to form the value. These investors have worked and worried and risked all for the purpose of keeping up with a rapidly progressing art. They, more than any other agency, have been responsible for the development of the modern city, and in dealing with them the cities should take all this into account.

If the public chooses the other alternative and assumes the interest on the securities of the railway until such time as these securities may be purchased or amortized, the scheme then becomes public control and private ownership. In this case investors will demand that the interest on their capital be guaranteed and that the investment be properly safeguarded until such time as the property is entirely purchased by the public.

Within the last year we have seen vast amounts of money raised within a few weeks by popular subscription, and there need be no fear that the public cannot raise the necessary money for the purchase of its electric railways. Securities issued by municipalities are popular, because investors like the tax exemption features, and these securities will be especially popular at this time because it is likely that the period of high taxation will continue for many years.

All things taken into consideration, there are great advantages in public ownership and there are no insurmountable obstacles to putting it into effect, if there is a disposition on the part of both parties to deal fairly with each other.

Taking over electric railways at this date, the public would have the advantage of interesting itself in an art which has been developed by private initiative. The public would reap the experience and technical knowledge which have been acquired over long years of experience and test by private investors. The public is in a much better position to take over this business at the present time than at any time heretofore. Equipment and methods have been standardized, working organizations have been selected and trained, and the whole industry can readily be taken over by the municipality or the state without any of the uncertainties which the public would encounter in developing a new business.

If we analyze the objections to public ownership of electric railways, it will develop that the only valid objection is the fact that public ownership of such enterprises is unusual and, in this country, untried. In the face of what we are seeing every day, however, this objection has no value. The unusual of to-day is fast becoming the commonplace of tomorrow. Electric railway executives should be the last to oppose public ownership. They will be accused of a selfish interest—a desire to hold on to their jobs. Our only real selfish interest is that of the investors. We should see to it either that they are protected in their investment, or that their principal is returned to them.

Application will be made to the next session of the Quebec Legislature for the incorporation of the Levis Tramways Company, with power to acquire the property and franchise of the Levis County Railway.

Features of Service-at-Cost Plan Franchise

A franchise which is unique and which possesses the necessary elasticity to make it valuable and effective when conditions return to normal has recently been put into effect in Cincinnati, Ohio. The franchise is the result of much study and wide investigation and is commensurate with the magnitude and importance of the undertaking. The contract, which embodies the most modern ideas of municipal control of street railway operations, is described by Mr. W. C. Culkins, director of street railroads, City of Cincinnati, in Electric Traction.

The proposed ordinance was studied out by a committee composed of the writer, the city solicitor, assistant city solicitor and two members of the council. When this committee submitted its report, they emphasized the fact that the need for relief both to secure adequate service and to properly compensate employes, was very real and pressing.

The new ordinance contains the following general provisions: A general transfer system; complete control of service and operation by the city; right of the city to re-route; authority of council to order extensions and establish new and additional routes; return to the company on its investment; franchise tax to be paid to the city; requirement that all leases, franchises, contracts, issues of securities or transfers of franchises be submitted to the city for approval; requirement of bond for faithful performance; privilege of police and firemen to ride free; rental of viaducts; amortization of the reducible debt; repayment of expenses of valuation and traffic survey; rentals; right of the city to purchase, either by condemnation or at the valuation agreed upon in said ordinance; and retention of routes as fixed in said ordinance.

Under the new ordinance the city, through the director of street railroads, may re-route cars at any time that it deems it advisable to do so.

Authority to Order Extensions

The old ordinance in force authorized the city to order extensions only under restricted conditions. The new ordinance gives the council absolute power to order extensions at any time, the only limitation being the inability of the company to sell securities by the usual method in the open market.

Control of Service

The old ordinance provided that the city might order improvements in service provided the cost did not impair the city or company's financial return. The new ordinance places no limitation except that the budget allowance has not been sufficient and this the city has the authority to increase by allowance for supplementary expenditures.

Rates of Fare

Reluctant as it was to consider an increase in fares, the committee was confronted with an abnormal situation due to the war, thereby increasing the cost of labor and material to such an extent that the Government has requested localities everywhere to deal with the problem of street railway fares in order that the best service possible be maintained.

The average operating expenses for the first five months in 1916 was 14.15 cents per car mile and including taxes and fixed charges the total was 26.11 cents per mile. For the corresponding period of 1918, operating increased to 18.36 cents per car mile and to a total of 32.23 cents per car mile, substituting for a surplus of 98 cents, a deficit of 3.55 cents per car mile. A further comparison of the same periods showed that the total cost per revenue passenger had increased from 5.03 cents to 5.86 cents per revenue passenger, while the earnings per revenue passenger from all sources was substantially the same, 5.22. In this period of 1918 the company has been losing .64 cents on every passenger carried. This was due, not only to the increased cost of operation, but to reduction in the number of passengers carried.

In 1917 the cost of coal increased $189,000, wages under contract $95,000, maintenance and renewals nearly $15,000, and other transportation charges about $20,000, also taxes $28,000, a total of nearly $350,000. The conditions of 1918 show a further increase required of nearly $500,000 for operating expenses and taxes, and an annual falling off in receipts of from $15,000 to $200,000.

It is not surprising that under these conditions the company was unable to issue securities for improvements and extensions or to maintain a credit necessary to obtain proper banking acommodations for the transaction of its business. In addition to this the committee found that the company was unable to pay a scale of wages to its employes comparable to that found in other industries. This obviously resulted in two things, the company could not offer sufficient inducement to retain enough men to operate its full service or to deal fairly with those who did remain. In this particular the condition of the local company does not differ materially from that of similar utilities in other cities, for the causes are national in their scope.

Fare Methods Considered

Consideration was given to various plans of fare collections, including the zone system, the flat fare, and the charge for transfers.

In the opinion of the committee the zone system, while presenting an equitable method of charging passengers in accordance with the length of haul, is novel in this country, presents difficulties in the way of adjustment to present equipment and would require considerable time to work out and therefore should not be undertaken at this time and under the circumstances when immediate relief is impertaive.

In considering the charge-for-transfers plan it was ascertained that the total number of transfer passengers in 1917 was 39,578,158. This number at one cent would produce $395,781.58, in itself not sufficient to meet the indicated deficit. Three factors were, however, considered. The records of the company showed a decrease in the number of passengers carried and also a decrease in the percentage of those passengers who used transfers, of from 39 per cent. in July, 1917, to 35 per cent. in May, 1918. In addition the charge for a transfer would further reduce the number of transfers used; therefore the income from this source would be very much reduced from the amount indicated in the statistics. It was clearly evident, therefore, that this plan would fail to meet the situation.

Service-At-Cost Plan.

It was consequently determined to retain the existing flat rate plan, but since the present revision covers a period ending April 22, 1931, and since the present war conditions are abnormal and unstable, it was the opinion of the committee that the fares should be based on a service-at-cost plan, by which they would automatically adjust themselves to the varying cost of operation. Actual costs naturally vary according to all kinds of fractions of a cent and at various seasons and even hours of the day. It is therefore obviously impractical to have a rate of fare that will at all times represent exact cost of service, since it must vary with the cent or some practical fraction thereof, to be effected by the use of tickets. Furthermore, the changes on rates of fare cannot be made from day to day, but must vary by periods of a reasonable length.

In order to give stability to the plan and prevent inconveniences growing out of too frequent changes of fact, a reserve fund of $400,000 was provided, into which shall be paid all surplus remaining after payment of operating expenses, taxes and allowed return to the company. This fund is under the direction and control of the city and is not to be used for any other purpose.

When the amount of this fund has reached $250,000 above normal, it shall be prima facie evidence of the necessity of reducing fares to the next lower grade.

If the income is insufficient to meet the payments before mentioned, the reserve fund shall be used and should it be reduced to $250,000 the fares shall be raised to the next highest grade, the decrease and increase to be at the rate of one-half cent each. The street railway company must provide the minimum of $250,000 for this reserve fund.

Methods of Fare Determination

In arriving at an estimate for an initial rate of fare, an analysis was made of the finances of the company for five years prior to December 31, 1917, and for 17 months ending May 31, 1918. It was evident from the figures that any comparison with the pre-war period, such as would be taken under ordinary circumstances, would be of little value, since the abnormal situation is due to the entry of this country into the war, and it was the war conditions which must be met.

In 1917, taken as a whole there was an increase in the number of revenue passengers. However, an analysis by months showed these figures to be misleading. In the early part of the year passenger revenue showed a decided upward tendency until September. From that time there was a falling off apparently coincident with the leaving of the selects for cantonments and the call for labor at the shipyards and other large governmental industries. Operating expenses showed an upward tendency due to the rapid rise in the cost of material and supplies, especially coal, which became much more marked in the last four months. In April, 1918, the company found it expedient and desirable to make an increase of two cents per hour to its employes under contract and a similar increase to all other employes.

It will be seen, therefore, that not only were conditions in 1917 so entirely different from the pre-war period as to be practically incomparable, but these were further changed in many respects during the present year, so that further additional increases were necessary.

The company had taken the years 1916 and 1917 as a basis in arriving at estimates for the present time. It was believed, however, that the first five months of 1917 and 1918 would furnish a more reliable guide and comparisons were made with these periods in two ways.

The first is for the entire five months periods, but since it could have been argued that in the months of January and February there were unprecedented weather conditions, causing loss of passenger revenue and increase in operating expenses and that these should be eliminated, a second comparison was made of the months of March, April and May of these two years, as presenting a more normal situation.

From this data the net cost of carrying passengers was found to be 5.746 cents per revenue passenger. In arriving at this, provision was made for a 25 per cent. increase in wages and for the additional freight charges on coal and other commodities ordered by the United States railroad administration.

The return to the company remains the same as in the previous ordinance, which was approved by a vote of the people, except that it was adjusted to cover the interest charges on notes for the purchase of new cars in 1917.

The initial rate of fare has been placed at 6 cents, and it is believed that the margin of 24 cents per revenue passenger will take care of any falling off of traffic due to the increased fare. As soon as costs of materials and supplies are reduced, a rate of even lower than 5 cents may become effective under the automatic plan, thus giving the public the benefit of the change without waiting until the end of the revision period.

The committee, in recognition of the 5 cent fare principle and as an incentive to the company to co-operate in the reducing of fares as soon as possible, provided that when fares are reduced to 5 cents the company may retain 45 per cent. of such surplus, the remaining 55 per cent. going to the reserve fund to further reduce fares. When fares are above 6 cents the entire surplus goes to the reserve fund, the company receiving no part of it. This fully meets the only objection raised against the service-at-cost plan, namely: that since the company is not affected by change in rates of fare there would be a tendency to indifference as to operating methods, throwing the burdens entirely upon the city to enforce efficiency. Under the plan presented, increased fares will always work to the financial detriment of the company, while the city has ample control over the service to prevent its impairment.

Plan New to Franchise Ordinances

In order to provide service-at-cost a city must be in a position to know that the cost is not excessive and that no improper or unreasonable charges have been made. Provision was therefore made for complete control over purchases, salaries and all other operating expenses of the company by a plan that is new in franchise ordinances. The company is required to prepare an annual budget, which must be approved by the city and all expenditures must be kept within the budget allowances and made only for the purposes therein provided. A supplemented budget may be filed for approval to meet emergencies. In addition the city has the power to disapprove the purposes of any voucher. There is approximately as much control over the financial operations of the company as the city would exercise over the utility if it were municipally owned. Provision is made for arbitration in case of a disagreement between the city and the company.

Working Capital Fund

A new provision in the ordinance is for the establishment of a working capital fund, which will appeal at once as essential to modern business operations on a large scale. This will enable the company to have on hand a sufficient amount of supplies, materials and cash to meet emergencies, make purchases to the best advantage, avail itself of discounts thereby effecting a saving in the cost of operation which will inure to the benefit of the car-rider. This is so generally accepted in modern business practice that no further description should be necessary. As in other instances, the amount and operation of the funds is under constant regulation by the city.

The electric light and power department of Saskatoon, Sask., for the first ten months of the year 1918, showed a profit of $3,196. The street railway system, however, went in the hole to the extent of $8,730. The waterworks department, with a profit of $10,234, enables the public utilities to show a net surplus of approximately $4,699.

A Diagram From Which May Be Readily Determined the Cost of Coal for Generating Steam

The accompanying diagram furnishes the power plant operator accurate information on the cost of coal for generating steam. Knowing the price and the amount of coal burned and the quantity of water evaporated, the solution is easy. Start with the cost of coal per ton and project vertically, intersecting the oblique line corresponding to the evaporation from and at 212 degrees F. being obtained from the boilers, then move horizontally to the left margin, where the cost of coal to evaporate one thousand pounds of water from and at 212 degrees F. is given. The chart can also be used to determine the evaporation required to generate steam at a certain cost, by reversing the above process. This chart should awaken interest in the relative efficiency of a mechanical stoker as compared with hand firing. The stoker shown in the illustration attacks Mr. Wasted Fuel from the following angles:

1. Smokeless combustion and a high precentage of CO^2.
2. Volatile substances in the coal are distilled before they are introduced to the incandescent fuel bed.
3. A forced draft system of air control supplies the correct amount of air mixture at all times.
4. Carbon often wasted in the ash is burned before dropping the dumping grates.

Montreal Tramway Extensions

Mr. Willard F. Graves, consulting engineer to the Montreal Tramways Company, speaking at a luncheon of the Kiwanis Club recently, said that extensions to the Montreal Tramway system would be commenced early next spring, as the company had been notified that the mills would commence rolling the required rails in January. These rails will be of the grooved girder type, weighing 115 pound to the yard. Mr. Graves stated that transportation systems throughout the whole continent were suffering from over-regulation by governments, municipalities and commissions and they were on the point of bankruptcy.

Touching on the capital tied up in the company equipment, he said that twenty per cent. of it was only in use for a few hours a day during the rush hours. There was 1,200 freight and passenger cars in operation, and they travelled 25,000,000 car miles a year through the city. He spoke of the difficulty of getting coal, and of the steps being taken to put in hydro-generators, and incidentally mentioned that the replacing of the cross section at the corner of Guy and St. Catherine cost about $30,000, while they had come to an arrangement with the city by which it was hoped to make those who excavated under the car tracks and thus damaged the paving for which the company was responsible compensate the company for the damage done.

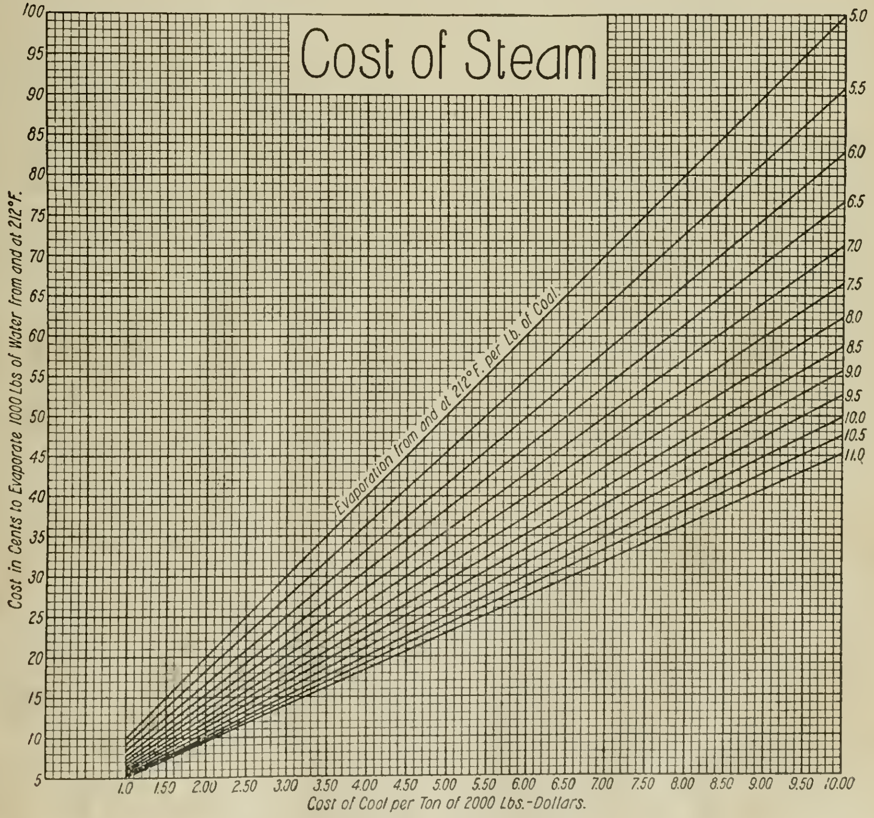

Chart to show the cost of coal for generating steam:

Municipal Engineers Will Meet in Convention January 30 and 31

The winter convention of the Association of Municipal Electrical Engineers will be held in Toronto, on Thursday and Friday, January 30 and 31. The meetings will be held at the Chemistry and Mining Building, College Street, head of McCaul Street. The programme so far outlined, is a most attractive one, including an address by Mr. W. B. Johnson, of the Montreal Light, Heat and Power Consolidated, on the subject "Advisability of central station companies handling appliances and supplies and maintaining standard prices as established by the manufacturers." Professor W. H. Price, of the University of Toronto, will give an oscillograph talk, and Mr. A. S. L. Barnes will read a paper on "Bare versus weatherproof wires for potentials higher than 750 volts." Mr. W. L. Goodwin has also been secured and will address the delegates on Friday morning on his well known subject of a closer co-ordination of the various elements of the electrical trade with a view to dissolving some of the well known ills. A dinner will be held on Thursday evening, January 30, at a place yet to be arranged, at which the speaker will be Mr. C. H. Hopper, of the Canadian Westinghouse Company. The business will include the election of officers of the association for the coming year. Commercial companies are reminded that, by a resolution passed at the Niagara Falls convention last spring, they are now elegible for membership in this association and we understand a number of companies have taken advantage of this invitation. The executive of the association wish it to be understood, however, that all will be welcome at the convention whether they are members or not.

Taxation and Municipal Railways

Bill No. 64, before the Ontario Legislature, is an amendment to the Assessment Act, and provides for the exemption of municipally owned electric railways from taxation. At a special meeting of the Assessment Committee recently a deputation from St. Thomas protested against the proposed legislation as applied to the London and Port Stanley Railroad, operated by the city of London. It was claimed that this road is not a public utility either in operation or origin, but is solely a commercial enterprise operated for profit. The company's restaurant and amusement business at Port Stanley was also referred to as being a direct competition to those merchants contributing taxes. Mr. T. G. Hellmuth, K. C., on behalf of the London and Port Stanley Railway, claimed that the road was operated at cost and without benefit to the city of London; also that the advantages derived by the townships and the village of Port Stanley more than offset a taxation.

Power for Nitrate Plant

The Union Gas & Electric Company, Cincinnati, Ohio, has recently contracted with the United States to supply power to the nitrate plant at Cincinnati. The company is to furnish electrical energy for the operation of the plant for a demand of not less than 30,000 kw. or more than 40,000 kw., the charge for which is to be computed on a combined demand and energy basis. The power factor guaranteed by the United States is to be not less than 85 per cent. at the power house. The load factor is estimated at 90 per cent. or better, and the estimated consumption of energy for the five year period is 1,750,000,000 kw.-hr.

A recent explosion at one of the buildings of the Canadian Electrical Products Company, Shawinigan Falls, Que., caused damage amounting to about $100,000. Four persons were killed and ten injured.

A Valuable Catalogue

The Eugene F. Phillips Electrical Works, Limited, are distributing a handsome catalogue descriptive of their wires and cables. This catalogue is divided into five sections. Section 1 deals with electrical conductors; section 2, bare and weatherproof wires and cables, magnet wires, cotton covered wires; section 3, rubber insulated wires and cables, flexible cords; section 4, paper insulated power cables and telephone cables, varnished cambric insulated cables; and section 5, general information. The catalogue is handsomely bound in convenient book form, 4½ by 7 inches, and is a regular encyclopedia of information regarding wires and cables, particularly the final section, which contains tables of weights and measures, conversion factors, temperatures, trigonometric formulae, natural sines, cosines, etc., definitions of electrical units and terms, systems of transmission and distribution, transmission losses, vector diagrams, etc. It is one of the most complete and well arranged catalogues we have seen.

Transferred to Dept. of Trade and Commerce

The Electrical Standards Laboratory, Ottawa, Mr. O. Higman, chief engineer, has sent out notice that the administration of the following Acts of the Federal Parliament have been transferred from the Inland Revenue Department to the Department of Trade and Commerce: The Electrical Units Act; the Electrical Inspection Act; the Electricity and Fluid Exportation Act; and the Gas Inspection Act.

Sherbrooke Gets Temporary Contract

For two days Sherbrooke, P. Q., was without a tramway service, the Sherbrooke Railway Company discontinuing its service owing to the council refusing to meet the request of the company for increased fares. The result of the deadlock was a decision of the council to grant a temporary new contract for five months, under which the fares are 5 tickets for a quarter; 6 workmen's tickets for a quarter within restricted hours, and seven tickets for school children for the same amount. On this basis the service was resumed. A new permanent contract will be drawn up and submitted to the taxpayers. The company and the council have been negotiating for a long time as to extension and fares.

As Great Britain has met with such signal success in its land cultivation programme, so, there are striking indications that a new spirit has been introduced into its industrial life which may go far towards establishing better relations between capital and labor. This new industrial movement is dealt with at length in a pamphlet, "Industrial Relations," already published by the Canadian Reconstruction Association. It furnishes further convincing proof of the progressive temper in which the United Kingdom is dealing with reconstruction problems.

The Winnipeg Electric Railway Company are adding ten new steel cars to their rolling stock. There are being manufactured by the Ottawa Car Company and are at present in the last stages of construction. The Winnipeg company are also re-constructing their present rolling stock at the rate of ten cars per month, forty cars having already passed through their hands.

The Dominion Iron and Steel Company of Sydney, N. S., recently awarded a contract for a 5,000 kw. turbo-generator and two 1,000 kw. motor generators, to the Canadian General Electric Company. The contract also includes a quantity of motor and accessory equipment.

The Dealer and Contractor

Why are Electrical Dealers not D-E-A-L-I-N-G? Why is This Profitable Business Left to the Hardware Man and the Druggist? Does the Goodwin Plan Solve the Problem?

In recent issues we have been pointing out the profitable business that by right belongs to the contractor-dealer, but is being handled by the hardwareman and others. Remembering the keen activity of the British Columbia Association of Electrical Dealers and Contractors, we addressed a letter to the secretary, asking an expression of opinion, and have the following most interesting reply from the president, Mr. E. Brettell. The question in our letter to which he refers, ran as follows:

"It is clear to everybody, we think, that the electrical merchandizing business ought to be handled by electrical contractors and dealers. Where then is the trouble? Is it because the electrical contractors haven't sufficient capital, sufficient enterprise, sufficient ability, sufficient backing by the manufacturers, or what is it?"

Mr. Brettell's Reply

Electrical Supply & Contracting Co. Limited,
Vancouver, B.C., 15th December, 1918.

Editor Electrical News:—

Your letter to Captain Conway, as secretary of our association, interests me very much, so much so that I am going to write you very fully on this subject, though I do so rather as an individual electrical contractor-dealer than as president of our association. Perhaps in my remarks I may appear to have my knife into big companies or corporations, and to start picking holes in them rather than putting our own house in order and endeavoring to help ourselves.

In answering your question—"Where then is the trouble—is it that the contractor-dealers haven't sufficient backing from the manufacturer?"

I am going to refer you to a splendid slogan, if I may use that word, which has been and is now being continuously displayed in "Electrical Merchandizing" and in this slogan that journal is doing much for the contractor-dealer: I refer to the following: "If your overhead is 23 per cent. and you want to make 10 per cent. profit you must add 50 per cent. to your cost of labor and material."

Now, Sir, let me give you two concrete examples and thereby answer "Is it that the dealers haven't sufficient backing from the manufacturers?" Here in our city if a dealer signs a contract with the ——— ——— ——— Company, or the ——— Company, as the case may be, to take $2,500.00 worth of mazda lamps, he gets a discount of 25 per cent. from the list price; mind you 25 per cent. off an article which is breakable and which one often has to replace to a good customer rather than lose that customer's business in other goods.

Now let it be granted that our overhead varies between 20 per cent. and 25 per cent., (and these figures have been proved): let us also consider the valuable time that is often spent selling a dear old lady perhaps one mazda lamp; next turn to the paper and string that is required, all of which must be taken into account when selling each individual article. Is there a single dealer in Canada who can say he makes money by the sale of tungsten lamps?

Again we are told: "Oh," says the man willing to argue, "Lamps to the electrical dealer are like sugar to the grocer—they bring customers to our stores." In this I fail to agree and even if it were so, there is no reason why a single article should be sold which is nothing more than a dead loss to the business.

Let us take another glaring example: The products of the company are offered by our wholesale houses here at a discount of 30 per cent. off the list. Here again are perishable goods, goods which depreciate if not soon turned over, lamps which are fragile; and on how many occasions do we have to replace batteries that some good customer only uses, or says he does, for a couple of hours.

I have taken the products of three well-known companies and in neither case is the discount sufficient to enable the slogan afore-mentioned to be carried out, and I maintain that in selling these goods the dealer is doing no more than making his overhead, or in other words, he is keeping his store open and running his business as a distributor for the manufacturer, and **absolutely nothing else.**

Another; may I copy Mr. Goodwin and say the "ill of the industry" to my mind is, that it is possible for any consumer, take for instance a lawyer, to purchase his goods elsewhere than in a retail store, and my "elsewhere" means with the electrical wholesaler. In this matter it may be true that the wholesalers, or many of them, sell at the regular retail price, but in other lines of business the wholesaler will not sell **at all,** but will refer his prospective customer to one of the retail stores. In these cases the dealer is losing profit which absolutely and entirely belongs to him. In this matter I therefore maintain that a wholesaler should be a wholesaler only.

After giving this matter much thought I certainly do not place the entire blame on the manufacturer; a great deal must also be attached to the dealer, but I do not believe in the theory that electrical dealers as a whole suffer from lack of capital, lack of enterprise or lack of ability. The electrical dealer, as I know him, compares very favorably with a dealer in any other line of business and, thinking this, I feel there is something wrong in the business, and that something is borne out by two of the examples I have given above.

The time never was more opportune when these matters could be taken up by the manufacturers. The public have become used to higher prices and an opportunity will occur in the period of reconstruction for the manufacturers to deal more generously with the recognized distributor.

In closing let me point out to every electrical contractor-dealer the absolute necessity of becoming a member of his local association. Let us endeavour, through our associations, not to pass heated resolutions against manufacturers, central stations, etc., but let us rather point out to them that if the dealer is to be the manufacturers's distributor of the future and is to rise to that "place in the sun" amongst business men to which a large majority, by hard work and long hours, are entitled to, reconstruction is necessary, and as long as this is delayed so long will the contractor-dealer hold that supreme seat at the head of the roll which shows that "more electrical dealers go out of business in proportion to the number operating than in any line of business."

This epistle may stamp me as a chronic kicker, but I have stated my opinions freely and I shall follow with the deepest interest any articles which may appear in your columns with reference to this most important matter.

Yours very truly,
(Signed) E. Brettell, President,
British Columbia Association
Electrical Contractors and Dealers.

Having Secured Mail Delivery, Installed His Telephone and Bought His Automobile, the Farmer is Waiting for His Light and Power Plant.

A few short years ago the farmer shook his fist at every motor car that passed his door. They "tore up the roads, frightened the horses, made the highways unsafe for horse drawn traffic and filled the air with unhealthy odors." To-day every well-to-do farmer owns his own motor car. With telephone, daily mail delivery, good roads and automobiles, what is it the farmer lacks to make country life contain all the advantages without any of the disadvantages of city life?

Only one thing, apparently—an electric light and power plant. And who is to sell it to him? The machine agent? But he knows nothing about installing and operating it. The contractor eventually comes on the job. Why is he not the logical man to make the sale and also take the profit? There is more profit in selling equipment than in installing it. Why neglect the more profitable work?

Mr. George W. Hill writes a good article in the Electrical Review in which he points out that city central station and power distributing companies have tried extending their lines into the farming districts, but as a rule it has not paid them because of the heavy cost of line construction. The only electrical current practical to use on the farm is from a low voltage, direct current plant on the premises. Those of us who have been connected with the electrical industry for the past thirty odd years, will remember the old direct current generators which perhaps lighted our home town. The other principal electrical feature of the plant is the electric storage battery, the practicability of which has been recognized for more than a quarter of a century. The only essential difference therefore between the plants which have been offered to the farmer and those formerly used for town lighting is the internal-combustion engine which is being used to drive the generator, and the automobile industry has long since solved the problem of the engine.

Nearly all of the farm lighting plants on the market to-day employ engines which resemble so closely the one which the farmer has been using on his farm or on his car, that little attention is paid to this feature of the plant except to know whether it is a two or four-cycle, air or water-cooled engine.

The farmer only has to be sold on the utility of the plant, what it will do for him, how long will it do it, and how economically as compared with other forms of light and power.

Adaptability and Advantages of Farm Lighting Plants.

The following is a list of the principal things which a good electric light and power plant will do for the country home.

It Betters Living Conditions.—It furnishes better and safer light, eliminates smoky, dirty coal-oil lamps, makes automatic water system possible, minimizes fire hazards, makes the home more cheerful and comfortable, saves much labor around the house, keeps the children at home, and attracts desirable company for the family.

It Pays for Itself.—It makes the following savings possible, thus quickly paying for itself:

Runs washing machine 4 hours each week	$ 1.00
Runs cream separator 14 times each week	1.05
Pumps water for a complete supply	1.00
Runs vacuum cleaner 7 times each week	1.00
Saves two hours each week in ironing	.60
Runs electric fan during hot weather	.25
Permits small boy to milk 50 cows 14 times each week, saving 3 grown persons' time 2 hours daily or 42 hours total weekly	12.50
Total (neglecting numerous other chores)	$17.50

Saving $17.50 each week for 52 weeks results in saving in labor cost of $910 in one year.

It should not be a difficult matter to sell a farmer something which betters living conditions and also pays for itself in a year or two.

It Modernizes the Country Home.—It provides constant water pressure for the lavatory, the bath, the toilet, and sink, sprinkles the lawn, and furnishes ample fire protection. It replaces antiquated, troublesome and inadequate lighting by modern, convenient and satisfactory lighting. It provides modern conveniences and helps make the country home practically as desirable in this respect as the city residence.

It Provides Convenience and Comfort to Those Who May Be Sick.—It heats water quickly, heats electric hot pad, operates electric fans, provides light at all times of the day or night by merely pushing a button. It does not burn the health-giving oxygen in the room. It provides current for call bells. It assists the doctor in his calls, assists the nurse in her duties and makes the sick room more bright and cheerful.

It Saves the Time and Labor of the Housewife.—It runs the washing machine and wringer, saves much work and many steps on ironing day. It saves the bother and time of taking care of oil lamps. It provides hot and cold water at the sink, sweeps the carpets and rugs with a vacuum cleaner, cleans furniture, mattresses and tapestry without removing. It runs the cream separator for her, pumps the water without effort or time loss, furnishes heat for toasters and coffee percolator, assists the mother in the care of her children at night.

It Saves Time and Labor for the Farmer.—It runs the milking and other dairy machines, farm mill, sheep and horse clippers, grindstone, saw, etc., and provides a bright light throughout yards and out-buildings. It saves much time and lessens the danger in getting about the place at night.

It Makes for More Productive Labor Hours in the Field.—A boy can milk cows, grind feed, pump water and do many other things, electrically which would require the time and labor of older persons.

It Keeps the Children at Home.—Boys and girls enjoy their home better because it is modernized. They invite and everyone enjoys having company. It causes both old and young people to have a pride in their home. Relief from many of the chores and much of the drudgery gives more leisure to enjoy the home. It provides the best light for students. All told, it makes the home a more desirable place to live in.

It Helps to Solve the Labor Problem.—It makes the farm more attractive to those seeking employment. It eliminates "Blue Monday." Ask mother why. It reduces the amount of work to be done and makes it possible to dispense with all or most of the outside help about the house.

It Is an Improvement to the Farm.—It increases the value per acre like other improvements. It is a valuable, profitable and permanent investment. Electric lighted farms sell more readily.

Opportunities for the Electrical Contractor-Dealer.

Think this over, Mr. Electrical Contractor, and tell us why you cannot sell such plants to the farmers of your community, where you can make him admit all of the above points. Any farmer will tell you that he will buy anything at almost any price which will better living conditions and pay for itself several times over during its useful life.

There are hundreds of thousands of prospects in America, who will sooner or later possess an electric lighting plant of some kind, yet the electrical industry has been asleep at the switch and is letting these great possibilities slip through its fingers.

The result is that the business is fast getting into the hands of the implement dealer, hardware and automobile dealers, and numerous other merchants are looking with eager eyes toward the electric farm lighting business as a means of increasing their annual profits materially.

This business logically belongs to the electrical dealer and contractor. He is the logical person to handle this industry in his respective community, because he is very likely the only person equipped to do the wiring and furnish the fixtures and utility devices. The profit on the sale of a plant, plus the profit on the things which usually go with the plant, is very attractive or at least should be to an electrical contractor and dealer.

Many of our present day contractors would be much better off if they were to spend the same time in the country selling a farmer a plant and installation with practically no competition than he would be playing the role of a Sherlock Holmes in an attempt to learn how much his competitor is going to bid on some house-wiring job where possibly the gross amount of the job would not equal the profit to be had in selling one country electric lighting plant.

The writer could never understand why the electrical contractor could stand idly by and let an opportunity as important as the electric farm lighting business slip through their fingers, while whittling pine sticks on the sunny side of their shops and howling about how rotten conditions are in the particular town in which they live.

Wake up, Mr. Electrical Contractor! Get into the game! Forget the competitor you are trying to put out of business, and put yourself into a good profitable business. You know how to sell goods. You know how to wire houses and barns, and you should be out and after this important, profitable and highly promising business.

Profits in the Business.

You can sell a farmer a lighting plant, do the wiring, hang the fixtures and complete the job, and make $200 clear on one reasonably sized job in less than a week. How many house-wiring jobs do you do in town to make $200? How often do you find, after doing a good many jobs, that in an effort to beat your competitor you have lost $200 or more? If you are in the electric business then the electric farm lighting belongs to you.

You may say that the plant manufacturers are not coming to you to induce you to accept the distribution of their plants. This is true at this time, but if you show signs of life you will find that they would prefer you to non-electrical dealers, because this solves the installation problem—the most perplexing problem they have to contend with at the present time. Now is the opportunity to take back that which slipped away from you when you were "asleep at the switch." The manufacturers are fast learning that the things most needed at this time to complete the cycle from manufacturer to user are intelligent selling and installing. There seems to be a tendency just at this time among these plant manufacturers to change their selling policy materially and this opens a great opportunity for the contractor-dealer to reclaim a branch of the electrical business which came very near being lost to the industry.

How to Do Business With the Farmer.

Secure the agency of some good plant and go to work. The farmer may be a stranger to you at first, but you will soon know him. And he will best know you by your conduct and especially if you deal honorably with him, for he will boost your game if he likes you. He is one of two things, either the best booster or the most persistent knocker in the world.

Sell the plants and make the user help you sell his neighbors. Sell him permanently. Sell him so that he will look to you for all of his electrical requirements. He will go out of his way to tell the world that you are a good fellow and that you treated him all right. He is the niecst fellow in the world to do business with, if you act perfectly natural when you are in his presence. Speak the farmer's language and don't give him the impression that you are the least bit wiser than he is. Just tell him about the merits of your plant, and don't knock the other fellow's plant. Just show him what the plant will do for him and you will find him an interesting listener and a reasonable person to do business with.

The farmer is accustomed to buying high-priced articles like tractors, automobiles, etc., and the writer has often sold a farmer an electric plant and installation amounting to from $800 to $1,000 in less time and with less effort than is sometimes required to sell some city customer a $47.50 vacuum cleaner or a bill of fixtures amounting to less than $100.

Merchandising to the farmer consists of having a meritorious article and the ability to tell him in a plain elementary way what it will do for him. It was first thought that the farmer would buy only cheap electric fixtures and the larger plant concerns arranged catalogs and displays based upon this idea, but they have found that the farmer demanded something better, and to-day the farmers are buying the highest class fixtures on the market.

The writer recently sold a farm electric light plant for $650 and he also sold the wiring, fixtures, a vacuum cleaner, iron and an electric washing machine, and when the job was finished the farmer handed him a check for $1,045 cheerfully, for there was not a better set of fixtures in ten homes in an adjacent town of 25,000 people. This job was completed in exactly five days. Four such jobs per month would net the dealer approximately $1,000 monthly, or $12,000 per year. This is possibly as much profit as would be had on three or four times the gross business done in town where unintelligent competition must be met.

The selling of an electric lighting plant to a farmer, if sold properly, places him in the market for an amount of wiring, fixtures, and accessories equal to, if not exceeding, the price of the plant He may not buy them all at once, but from time to time you will be called upon to furnish one or more utility devices The good, conscientious dealer who sells 25 plants in his neighborhood has made a nice profit on the sale and has created a demand for some ten to twelve thousand dollars worth of lamps and other accessories within the next 12 or 18 months.

How do you Figure Selling Prices and Profits? How Many Times Turn Your Stock in the Year?

It is often said that electrical contractors are poor merchandisers—they are weak on bookkeeping and organization; forget about their overhead charges and otherwise conduct their businesses as good business men ought not to do. A good helpful article by W. R. Thompson, of the Industrial Service and Equipment Company, of Boston, on figuring costs, in a recent issue of Contact, runs as follows:

How Shall We Figure Selling Costs?

"Shall profits be figured on the cost or the selling price?" has in the past few years been a much mooted question. It is coming to be common practice, however, to figure profits on the selling price, merely because the other figuring operations involved are simpler. Otherwise, it doesn't make a particle of difference which method is used, so long as all percentages are figured in the same way. There are, however, several important considerations in figuring profits which are often overlooked and which it is the purpose of this article to discuss.

A percentage of profit, like every other percentage, arises from the ratio of certain figures. For instance, at the end of the year when a merchant has calculated his year's profit, he has only to divide this profit by his volume of business to determine the part of every dollar that is left as profit. In like manner, if he divides the total cost of doing business by the volume of sales, he has the part of every dollar that went into expenses. Again, if he divides the total cost of goods sold by the volume of sales, he has the amount of every dollar that represents merchandise sold.

Suppose for illustration that your sales for the past year amounted to $50,000; that the cost of the goods shown by a carefully taken inventory and a depreciation charge, was $30,000; and that the total cost of doing business was $15,000. This would leave a net profit of $5,000, which would be ten per cent of the total sales. Cost of goods would be sixty per cent., and cost of doing business thirty per cent. of the sales. This means that to maintain the same profit and sustain the same cost of doing business the mark-up for the coming year must, on the average, not fall below forty per cent. of the selling price. Notice that I say "on the average," which does not in any sense mean that each individual invoice should be marked up at that rate.

The purpose of establishing an average mark-up percentage is simply to check up on all purchases as a whole. This seems to be a point of view that is hard for many retailers to understand. Average mark-up, based on the past year, simply determines the average gross profit you may expect in your particular line.

Turnover a Vital Factor.

The amount that any individual invoice should be marked up should be determined on the basis of turnover. For instance a line of goods which will turn four times a year can profitably be marked with one-fourth the mark-up of a line that turns only once.

As a matter of fact the factors that determine the price are generally market conditions and customers' desires. But any individual mark-up should at least equal that average gross profit multiplied by the average turnover in your store; this result, in turn, divided by the estimated turnover for the line being marked. To continue with figures used above, your average mark-up has been established at 40 per cent. Your average rate of turnover is, we will say, two and one-half times a year. Multiplying forty by two and one-half you obtain 100. Now suppose you are marking an article that past experience shows you should turn over four times in one year. Dividing 100 by four you obtain 25, which is the percentage of mark-up that the article in question should bear. Still figuring your percentages on sales, and supposing that the article in question costs 75 cents, you should be able to sell it for at least one dollar. If it will not sell at that figure, it should not be stocked unless for some reason it is desired for advertising purposes; that is, as a leader or because it is an article that people demand in stores like yours.

Variations of the Mark-Up

One of the records of the greatest value to the management is that of purchases showing the variations of the mark-up. It is by watching this variation rather than by watching sales, that the gross profit can be controlled. Do not misunderstand me. I do not say that sales should not be watched, for they should be— both by clerks and by departments. Increased sales is a thing to promote. The point I want to make clear to every merchant who doesn't already see it, is that unless the goods that you are pushing to increase sales show proper mark-up each month, the expected profits will never show up in the form of actual earnings.

Personally I am of the opinion that there is more benefit to be derived by having a proper record of purchases, showing the expected gross profit, so that each month the merchant can see how near his purchases show his average mark-up necessary, than by any other method. Once a thing is bought it has to be sold, so the place to put on the brake is before the order is made.

If every retailer would get into the habit of figuring the mark-up and turnover of a line before he buys, and comparing it with his average needed to cover his cost of doing business and his desired profit, he would have less goods upon which he must force a sale by special prices.

Study Mark-Downs.

Of course, it is a well recognized fact that certain articles will have to be marked-down in order to get rid of them. All such mark-downs, however, result in a reduction of the average mark-up or gross profit estimated. Unless the management takes this fact into consideration in figuring the expected profit for the year, it will, of course, fall short by the amount of the reductions.

Many retail stores are paying for their own reductions by taking them out of net profits, instead of counting mark-downs as a regular cost of doing business and including it in the original mark-up average which must be maintained.

Every retailer should keep a record of all reductions and make provision for this expense as he does for all other costs. Such a record is easy to keep. One may have a special note pad on the counter on which every reduction is noted or the amount of the reduction as well as the amount received or charged may be recorded on the sales slip.

Each day's reductions should be totaled and posted to the mark-down record. At the end of the year, or six months, or whenever you have an accounting, the total of all reductions should be found. These should be divided by the total sales during the same period of time. The result will be your percentage of mark downs and this percentage should be added into the estimated gross profit in figuring mark up. For example, suppose that you have found your other expenses are 28 per cent. of your sales, you want to make 10 per cent. net profit, and your mark-downs total 2 per cent. of your sales. By adding these you have 40 per cent. which must be your average mark-up.

Keeping the Store Force on Its Toes — How Advantages of an Adequate System of Daily Records Speed Up Turnovers

By Mr. Perry F. Nichols*

"Well, I won't take one to-day, but maybe I'll be in again," said Mrs. Palmer as she turned and left the store.

Now every clerk knows what such a statement generally means. It means that the customer will keep on looking around and probably buy elsewhere, if she buys at all. In most stores her statement would have been the end of the matter. The clerk would probably have regretted losing a possible sale. But that would have been all.

But it was otherwise in the store of The Edwards & Chamberlin Company, of Kalamazoo, Michigan. Charles Stewart, a clerk, who had been showing Mrs. Palmer electric vacuum cleaners, went over to a small desk on the counter and made out a "prospect slip" from remarks she had made. While he had been waiting on her, Stewart had found out that the woman's name was Mrs. Sidney Palmer, that her husband was a machinist earning good wages, that they had just come to Kalamazoo, that her address was 1426 Prospect avenue, as well as a number of other bits of information showing in what kind of goods she and her husband would likely be interested. This information was copied on the prospect slip which was then sent to the advertising department.

Arrived at the advertising department H. C. Teller, advertising manager, placed Mrs. Palmer's name on a mailing list of those interested in vacuum cleaners. Several pieces of advertising, including a personal letter, were sent to her, all setting forth the advantages of the particular cleaner in which she was most interested. The result was that about 10 days later she came in and bought the cleaner. And that was not all. She became a regular customer of the store, buying many household supplies there.

The foregoing incident is only one of many similar incidents that occur every day in this store. The clerks are up on their toes every minute trying to turn each shopper into a customer—if not at once at least eventually.

How the Sale Was Clinched.

The management has worked out an exceptionally effective plan for keeping the clerks interested in preventing any sales from getting away. It begins with the daily sales slips and ends with a 1 per cent. commission on each clerk's sales, the commission being paid every six months.

The clerks are numbered, and as the cash sales slips come up to the cashier's office they are placed on spindles with corresponding numbers. Each morning these slips are added and posted on a daily sales record. The charge sales, which are kept separate from the cash sales, are also added, and each clerk is credited with the charge sales which he has made. The cash and charge sales are then added together thus giving the day's total for each clerk.

At the end of each week these daily sales are transferred to a weekly report and totaled. The number of sales made by each clerk is also recorded on this weekly sheet. One of these weekly records is shown here.

The first general column is headed "position" and under that are the sub-headings "amount" and "number." Under these two sub-headings are placed the rankings of the various clerks. That is, the clerk whose sales total the largest amount of money has a figure one placed opposite his name in the amount column, the second in rank a figure two, and so on. The same plan is followed in respect to the number of sales made by each clerk, as the clerk who has the largest money total does not necessarily make the greatest number of sales. The remainder of the blank is self-explanatory.

Each clerk receives a card every week showing his position with reference to the number of his sales and also their amount. This keeps up the interest and there is always a friendly rivalry to see who shall occupy the first places.

Record of No. and Amount of Sales for Week Ending ______________ 191

POSITION		NAME	No.	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	TOTAL	
Amt.	No									No.	Amount
			1								
			2								
			3								
			4								
			5								
			6								
			7								
			8								
			9								
			10								
			11								
			12								
			13								
			14								

Weekly record sheet showing daily and total sales made by each

The large record sheet mentioned earlier goes to A. B. Teale, manager of the retail department. This gives him a check-up on what each of the clerks is doing and enables him to give a word of praise to those whose records are satisfactory and help up to scratch those whose marks are not so good.

Records That Helped.

Here's an example. Not long ago, the sales of one of the clerks keep steadily dropping off. The management figured out that during a six month's period his salary had amounted to 12 per cent. of his sales. That was obviously too much. So he was called into the office and Mr. Teale had a heart-to-heart talk with him, explaining that no electrical merchant can afford to pay a clerk more than 10 per cent. of his sales, and that the percentage really should be lower than that figure. The result of this little talk was a decided increase in this clerk's sales, and a dropping off in the ratio of his salary to sales.

To help the clerks make good records, there is a short fifteen minute meeting every morning, when problems of selling and other matters of store interest are taken up and talked over. Then there are the prospect slips, already mentioned, and suggestion and recommendation slips, all intended to help make it easier to sell goods. The suggestion slips are green sheets of paper on which clerks are encouraged to write suggestions and recommendations for improvement in the service. The ideas suggested include everything from the fact that the back door needs a new lock to the recommendation of a plan for improving the delivery service. A record is kept of the prospect cards and suggestions made, as every clerk is supposed to hand in at least one of each weekly.

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* Burroughs Adding Machine Co., Detroit, in Contact.

A Novel Efficiency Plan.

Another novel plan for keeping the sales force at top notch efficiency is the bulletin book. This is a book located on a stand in a central position on the first floor. Here bulletins from the management are posted from time to time. These bulletins cover all manner of store matters. Each employee is supposed to look over the bulletin book at least every 24 hours, and read the new bulletins. There is a series of numbers of from 1 to 100 at the top of the sheet: after an employee reads an announcement he is supposed to check his number, showing that he has seen the notice. This is a simple method of being certain that the employees are informed of all of the things they should know

But however helpful the friendly rivalry and bulletins may be in sustaining a keen interest in 100 per cent. salesmanship, the firm of Edwards & Chamberlain recognizes that it demands a more direct appeal to the clerks' self-interest to keep undimmed their desire to become first-class salespeople. As a clincher, therefore, to keep them sold on the proposition, each clerk in addition to his regular salary is given a commission of 1 per cent. of his, or her total sales. The commission is computed twice each year.

The new plan of payment went into effect January 1, 1918. It is too early, therefore, to vouch for its effectiveness. But this much is certain: The sales for 1918 are showing a steady gain over those for 1917, and the clerks' appetite for speeding up sales shows no sign of satiation.

How Much Is Your Overhead?—An Association Formed to Study this Problem

The Electrical Estimators' Association is a live organization in Chicago. Recently they met with the Chicago Association of Electrical Contractors and Dealers to discuss and decide as far as possible the extent of the overhead expenditure of the electrical contractor. The meeting is reported in the Electrical Review.

It is well known that this overhead charge is probably the least understood and most unruly item entering into the finished estimate. As a result, overhead has probably stolen more profits and killed more enterprises than any other item entering into business cost. The Estimators' Association recognized some time ago, that before the contracting business could be placed on a secure and stable basis, this problem must be solved. Accordingly a committee was formed which, after an exhaustive study of the situation, presented at this meeting one of the best solutions so far devised.

It was decided early in their investigations that percentages of the annual business or any other method which involved the average percentage of a number of jobs of different sizes would not suffice. This was the result of the well-known fact that the percentage of overhead is much higher on a small job than it is on a large one. For this reason, any average percentage for jobs involving different amounts would overtax the overhead on a large job to make up for the loss created by underestimating it on a small one. This condition would be but little better than the existing condition.

The obvious remedy, therefore, is to change the percentage of overhead charged to jobs of different sizes. In accordance with this scheme the committee arranged a tentative curve which gave the approximate percentages to be charged to different jobs according to their size. A description of this curve and the conditions which led to its adoption were presented by E. L. Morley, and the L. K. Comstock Co. This curve, which starts with 52 per cent. for a job costing $200 and reaches a practically horizontal line at 8.5 per cent. for jobs of $160,000, will be reported with the full text of Mr. Morley's address in an early issue.

In opening the discussion Mr. W. C. Goodwin suggested that this curve be immediately adopted by contractors, but, to perfect the plan, recommended that on account of the varying amount of supervision necessary, for example in wiring a factory as compared with a church having the same cost, auxiliary curves covering the different classes of installation should be drawn up.

In the active discussion which followed, many interesting points were brought out which proved the growing necessity of such a curve to the contracting business. That something must be done to stabilize prices, which were often so widely distributed as to cause owners to decide to do their own work, was the general idea expressed by many of those present.

Mr. Goodwin called attention to the laxity of contractors in continuing their relations with customers whose premises they wire. The contractor should not be satisfied with merely installing the original wiring, but should endeavor to continue and extend his operations. As the first electrical man on the job the contractor has a distinct advantage over the jobber or manufacturer in selling the customer his apparatus and appliances. In addition, a sincere effort should be made to contract for the maintenance of the plant. When this condition is reached, that is, when contractors have stores at which they sell appliances, etc., and the maintenance of electrical equipment is done by contractors on a contract basis, then only will the contractor occupy the position in the electrical field to which he is entitled.

Toronto Contractors and Dealers

A meeting of the Toronto Branch of the National Electrical Contractors and Dealers Association was held on December 12, at the King Edward Hotel. Applications for associate membership were received from two of the most important electrical concerns in the country—the Canadian General Electric Company, and the Northern Electric Company, the former company being represented by Mr. J. F. Edgar, and the latter by Mr. Davis, their district manager.

One important question brought up was the practice of some contractors requesting from their suppliers falsified invoices, and association went on record very definitely against such dishonest practice.

There was also some discussion on the cost plus percentage system of taking work and Mr. Geo. Dale was appointed as a committee of one to correspond with other associations to secure information regarding their standard practice in regard to work taken on this basis.

The report of the Labor Committee was read and it was asserted that negotiations with the union were proceeding in a very friendly way. Further announcement will be made later as to what agreements are reached.

A preliminary report of the treasurer was presented in regard to the expenses of the Goodwin campaign. The report of the Joint Examining Board was also read and there was considerable discussion on all the points.

The attendance at the meeting was fair but not up to the average, and it was unanimously decided to go back to the former customary dinner previous to the meetings. The date of the next meeting will be January 9, the second Thurs-

POWER CABLE

350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

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MONTREAL

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day of the month. The place will be announced later to all the members.

It is important that all the members of the old association should have their formal written applications for membership in the National Association in the hands of President McIntyre before the first of the year. It has been announced that all the members of the British Columbia branch of the association have already sent in all their applications for membership.

Fine Store of Main Electric, Montreal

The store of the Main Electric Company, 165 Craig Street West, Montreal, is one of the largest in the city, being 150 x 140 feet. The store is in the form of an L with the office at the end. The L portion is devoted to lighting fixtures, which are hung from the ceiling and placed on tables, with a special shelf for glass globes. Except for the space reserved for the office, the other portion of the store is set aside for the retail sale of supplies. These are mainly kept in a long row of fixtures placed behind the counter, and so arranged that the heavier supplies are kept on the bottom rows. The bins for lamps are placed at the same height as the counter, and occupy one entire row of the fixtures. In addition to the store, there is a large warehouse at the side. The company, of which Mr. J. Rosenthal is manager, does a wholesale as well as retail trade. A very large stock of supplies and fixtures for "factory and home" is maintained.

Interior Main Electric Company's store, Montreal

Mr. Contractor Dealer—Electrical Goods "Sell Themselves" But the Hardware Men Get the Profits

An unusual impetus to the sale of electrical labor saving apparatus for women is promised by Miss Christobel Pankhurst, the noted suffragette, in her election platform. She promised the voters that when the women's regime prevails in parliament every house, no matter how small, will be lighted, heated and served by electricity.

The British Parliament, she asserted, will be responsible for the electricity that turns the mangles, cooks the meals and warms the houses. Why, she asked, should women drag coal scuttles about and stand over steaming washtubs, spend hours over old-fashioned ranges, which not only eat up coal, but cook the cooks, when by legislation and electricity the burden of the world can be lifted.

That is merely the forerunner of a development that promises immense business for hardwaremen, not only in England, but all over the world. In Canada it is predicted by many that the uses of electricity in the homes will double and treble in the next ten years. Already hardware men are selling a big share of the electrical devices and they are doing a steadily increasing business. Both the electrical manufacturers and the hardwaremen are going after this business aggressively and as the goods largely sell themselves, because their usefulness needs little or no demonstration, the business is growing by leaps and bounds.—From a Canadian Hardware Journal.

I Am Your Worst Enemy

I am the ruler of retail reverses.

I am the Lord High Potentate of Failure.

I am the reason for that downward slant on your profit curve.

I am the cause of the silent sickness that stills your cash register bell.

I am the origin of dissatisfied customers and loss of trade.

I am the leaven of uncertainty in the midst of certain profits.

I am the element of chance that turns a winning business into a losing gamble.

I am the fountain-head where springs the majority of your troubles and worry.

I am the key to the problem why more than 15,000 retailers fail every year.

I am the why and the wherefore, the direct and proximate cause, the germ and the genesis of unsuccessful merchandizing.

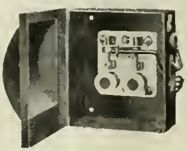
I am the Sticker, the Shelf-Lounger, the Left-Over, the nameless child of an unknown father.

I am the unadvertised product!

Retail Public Ledger.

New Square D Safety Switch

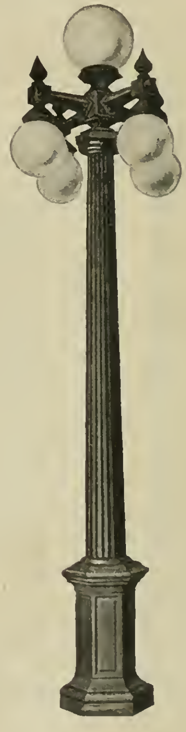
The accompanying illustrations show the new safety service entrance switch recently introduced by the Square D Company, of Walkerville, Ontario. The switch is catalogued as No. 56211. The chief features of the switch, aside from safety, are compactness and low price. A special porcelain plate has been developed to aid in cutting down unnecessary size, and giving more room for making connections. The extra room and shallow sides make this type of safety switch very popular among the trade. The switch is constructed of sheet steel, with a latch which may be locked, so that unauthorized persons cannot open the door. Four one-half inch knockouts are provided in the top and bottom of the box, thus making it adaptable to any style of wiring.



The Essex Terminal Railway, a belt-line running through the factory districts of Windsor, Sandwich, Walkerville and Ford, is to be extended in include Amherstburg, 18 miles west of Windsor.

Battery Charging—The Main Electric Manufacturing Company have issued a bulletin describing their battery charging equipment for public garages. This is a small capacity equipment for isolated garages.

BALL GLOBES FOR EXTERIOR LIGHTING



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give the next thing to daylight, and have been selected for the lighting of thoroughfares in many of the largest cities of the Dominion. They are the best for "White" Way lighting.

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Current News and Notes

Alvinston, Ont.

A by-law has been passed by the town of Alvinston, Ont., authorizing payment of $2,807 for the purchase of the plant of the Alvinston Power Company.

Brantford, Ont.

A by-law will be submitted on January 1 to the ratepayers of Brantford, Ont., authorizing an expenditure of $125,000 for extension of the street railway to Terrace Hill.

London, Ont.

The latest compiled census of the population in London, Ont., estimates the number at 67,243 and there is consequently a need for street railway extensions. The company claim, however, that, as they have been refused fare increases, they are unable to finance any improvements. It is proposed, therefore, that the new 1919 City Council take up the matter of "service-at-cost" with a view to overcoming the difficulty.

Lucknow, Ont.

A by-law will be submitted to the ratepayers of Lucknow, Ont., authorizing an expenditure of $5,000 for the purchase of the electric lighting plant of Walter Stewart & Son.

Montreal, Que.

It is said that negotiations are advancing with respect to a possible amalgamation of the power plants of the Montreal Tramways and Power Company with the Montreal Light, Heat and Power Consolidated, and that sufficient data is on hand to enable the directors to bring the matter to a definite head. The combined capital of these two organizations is in the neighborhood of $100,000,000.

Niagara Falls, Ont.

A by-law will be submitted to the ratepayers of Niagara Falls, Ont., on the question of purchasing the Niagara Falls Street Railway and operating it as a municipal enterprise. The road is at present being run at a loss, but the city fathers believe that in their hands it would become a very paying utility. In the event of the by-law being passed the company will be given a year's notice dating from March, 1919.

Orillia, Ont.

The Water, Light and Power Commission of Orillia, Ont., report for the year ended December 10, total power house receipts of $112,005, of which $76,553 was for power and the balance for light. The operation and maintenance of the plant cost $31,606, which is nearly $15,000 more than the cost before the war. In addition to this, $18,400 was paid for debenture interest, $13,133 was paid off debentures, $1,800 was contributed to patriotic funds, $2,222 expended in substation reconstruction, $10,000 set aside for depreciation, and $5,000 was set aside for the insurance contingency fund. The total amount expended in connection with the Swift Rapids plant was $179,390. The debentures provided for $110,000; the Dominion Government paid $25,000, and $10,000 is to come from the Hydro-electric Commission.

Toronto, Ont.

A by-law has been passed by the Toronto City Council authorizing the expenditure of $650,000 for extensions to the hydro-electric line and other purposes.

The Toronto Street Railway Company now operate over the new Bloor Street Viaduct, connecting Bloor Street with Danforth Avenue. The Bloor Street cars, which commence the eastward trip at Bloor and Lansdowne, have been routed to travel directly cross-town over the viaduct, instead of turning down-town as they did formerly. The cost of the viaduct was in the neighborhood of $2,500,000 and about 15 minutes is saved on the cross-town trip.

The Hydro-electric Power Commission of Ontario is asking the Dominion Government for a refund of an amount between ten and fifteen million dollars expended on plant, machinery and duty in connection with the new Nigara pipe line. It is claimed the pipe line will be unnecessary on account of the Chippewa development and that it was carried through purely for war purposes.

The eighteenth annual general meeting of the Toronto Electric Light Company's Employees Mutual Benefit Society, recently held, showed total receipts for the year amounting to $1,480.85. After meeting all liabilities there was $218 left on hand. Officers elected are: Hon. President, R. J. Fleming; Hon. Vice-President, D. H. McDougall; President, W. Rodgers; Vice-President, C. Richards; Secretary-Treasurer, E. Felton.

Uxbridge, Ont.

A by-law will be submitted on January 6th in Uxbridge, Ont., authorizing an expenditure of $7,000 for the purchase and improvement of the local electric lighting plant.

Personals

Mr. G. I. Davidson has been appointed advertising manager for the Canadian General Electric Company. He has been with the company for eighteen years.

Mr. John Mitchell, inspector of C. P. R. telegraphs, eastern division, has been promoted to be superintendent of traffic, eastern lines, in succession to Mr. W. M. Thompson, transferred to the superintendency of the eastern division.

Mr. H. D. Townsend has been appointed electrical superintendent of the Dominion Iron and Steel Company's works at Sydney, N. S., succeeding Mr. Collins, who has gone to the United States. Previous to going to Sydney Mr. Townsend was chief electrical superintendent for the United States Steel Company, Lorraine, Ohio.

Mr. M. C. Gilman, formerly sales manager of the Toronto Electric Light Company, and for the last few months manager of Willis L. Adams' Montreal office, has joined the staff of the Montreal Light, Heat and Power Consolidated, as special agent and research engineer. Mr. Gilman for a time acted as secretary of the Canadian Electrical Association.

Mr. Charles F. Gray, M.I.E.E., M.A.I.E.E., consulting electrical engineer, Winnipeg, has been elected mayor of Winnipeg, by a majority of almost 5,000. At the former civic elections Mr. Gray was re-elected to the position of Controller, in charge of Street Commissioner's Department, Fire Department, Civic Offices, Assessment Department, Building Inspection, Library and Public Baths. He was also placed on the Police Commission.

Mr. Arthur Moss, chief engineer of the Hydraulic Service of Quebec and member of the Quebec Streams Commission, has been added to the Dominion Power Board as a representative of the water power interests of the Province of Quebec. It is stated that arrangements are being perfected for a conference early in February of all Dominion and provincial organizations which have to do with the investigation or utilization of power resources.

Kraft Cord "Braiduct"

Made in Canada under Canadian Patent No. 147,057

This cut is reproduced from an actual photograph, and illustrates the behavior of the material in this rigid test—perfect flexibility. We cut the ends to show plainly the superior construction—note the high grade Canvas Duck Lining and the KRAFT CORD winding. This KRAFT CORD is made to our own specifications and is fire-proofed, which is entirely new.

KRAFT CORD "BRAIDUCT" is in a class by itself—superior to any imported conduit—is absolutely the last word in flexible non-metallic conduit construction.

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KRAFT CORD "BRAIDUCT" is packed in heavy fibre boxes, each box containing four coils (1,000 ft.), insuring product against damage in transit.

KRAFT CORD "BRAIDUCT" is regularly inspected and labelled by the **Underwriters' Laboratory** under the direction of the **National Board of Fire Underwriters** and every coil carries their label.

We will be glad to send you a sample.

The Flexible Conduit Co.

Limited

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Motors For Sale or Exchange

We have the following 60 cycle,, 3 phase, 220 volt motors for sale or exchange for 25 cycle motors of same H.P.

1—40 H.P. Crocker-Wheeler, 1200 R.P.M.
1—35 H.P. Westinghouse 1200 R.P.M.
1—25 H.P. Crocker-Wheeler 1200 R.P.M.
1—15 H.P. Fairbanks-Morse 1180 R.P.M.

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ELECTRICAL CONSTRUCTION MAN, electric motor installations. Also one electric motor repair man. Scott Bros. Electrical Co., Windsor Ont. 24-1

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AN OPERATOR for a small Electric Light Plant, married man preferred. Apply, stating experience and give references, to Westbury Electric Light & Power Co., Box 83, Cookshire. Que. 1

WANTED

ELECTRICAL ROAD-SALESMAN to travel London District for large Electric Manufacturing and Jobbing Company. State salary and experience. Would prefer married man. Address, W. R. O., 141 Roxboro St. East, Toronto. 1

Experimenters have found that the usually difficult problem of providing an even temperature for bread raising can be solved with Mazda lamps, says the Mazda Stimulator. A 40 watt Mazda, or larger if the sponge is large, burning in a cardboard box placed over the covered bread pan, provides an even temperature and helps to relieve some of the housewife's difficulties in bread making.

Conduit Should not be Fished Until Plastering is Completed

Conduit should not be fished until the plastering is completed, because prior to the putting on of the plaster there is always a possibility of the conduits being interfered with. If they are fished before the plaster is on and are accidentally displaced, the fish wire may be bound in the conduit in such a way that it cannot be withdrawn. For these reasons some engineers and architects insist that the above specifications in regard to fishing be followed.

Motor Wire Straightener

In the establishment of the Campbell Industrial Company, Chicago, a motor wire straightener is in successful operation. To adapt a motor for this service a hole is drilled through the motor shaft, unless the shaft is already hollow. Then a tube is bent so that it has a couple of "waves" in it. If no tube of suitable diameter and proportions is available, a rod, through which an axially-located hole has been drilled, can be used instead. Then this bent tube is fitted into the end of the motor spindle and held securely therein. The motor should operate at from 1,800 to 2,000 r.p.m. The wire to be straightened is first threaded from the spool, upon which it was shipped, through the hole in the motor shaft and then through the bent tube. Then the motor is started and as it rotates the wire is pulled through and will be straightened by the process. —Electrical Merchandising.

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1	100	3	25	550	480	Westg.
2	52	3	25	550	720	Lancashire
2	50	3	25	550	725	Westg.
1	30	2	60	220	1500	T. & H.
1	35	3	25	550	720	Westg.
1	30	2	60	220	720	Fbks.-M.
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	20	3	25	550	710	Westg.
1	15	3	25	550	1500	C. G. E.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	10	3	25	550	720	Westg.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
3	5	3	25	550	1440	Excelsior
1	5	3	25	550	720	Westg.
5	4	3	25	550	1400	Excelsior
2	3	3	25	550	1500	C. G. E.
2	3	3	25	550	1400	Excelsior
1	1	3	25	550	1400	Excelsior

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FOR POWER, LIGHT AND TELEPHONE WORK
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From Theft or Breakage LOXON Does It!
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Electrical News
Generation, Transmission and Application of Electricity

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Electrical Progress in 1918

Following their usual custom, the Westinghouse company have prepared a comprehensive resume covering the various items of electrical manufactured articles in which marked development has been noted during the recent past. Naturally, and essentially, developments have been restricted along lines best suited to the prosecution of the war, but since this has called for a vast amount of manufactured products, it follows also that this development can now be utilized almost equally well in peace industries. There has not, of course, been the same incentive to introduce economies since speed has been the dominant note in all war work. From now on we may naturally expect, therefore, that inventions and improvements in equipment will follow slightly different lines, having in mind the necessity for greater economies forced upon us by high labor costs, high cost of materials and keen foreign competition.

Electricity has played a big part in the propulsion and operation of submarines and in radio work. The later types of airplanes carry generators for the latter purpose. A wonderful extension of the use of electric furnaces is also noted. The figures for England show that the capacity has been doubled many times since war broke out and when the facts in enemy countries come to be known it is anticipated that a similar situation will be found there. Arc welding also has had a much wider application, being used in shipbuilding and in manufacturing industries using iron and steel. Recently a large electrically welded rivetless ship was turned out in England, and another is building. Electric drive has also made considerable progress in the refrigerating and ice-making industry, due to the fact that it is very much cheaper to make ice in electrically-driven plants as plants now equipped with electric motors are making ice at an electric consumption of 42 kw.h. per ton. Another very utilitarian use to which motor drive has been applied is in the operation of electric shovels. A splendid example of this is the large Bucyrus machines used by the Ontario Hydro on their Chippewa Canal excavation. An order was also placed for the largest electric generator to date for use at Niagara Falls—on the U. S. side—a 32,500 kv.a. machine, and the near future will see a call for tenders on one or more 45,000 kv.a. generators for the Chippewa plant.

Municipal Engineers Meet Jan. 30-31

Our readers are again reminded that the winter convention of the Association of Municipal Electrical Engineers is scheduled to meet in Toronto, Thursday and Friday, January 30 and 31. Mr. W. L. Goodwin addresses the convention on Friday morning.. Other interesting features of the two days' programme, as outlined in our issue of January 1, are: an address by Mr. W. B. Johnson, of Montreal; an oscillograph talk by Professor Price; and a paper by Mr. A. S. L. Barnes. The dinner, which is scheduled for Thursday evening, will probably be held at the Carls-Rite Hotel, though this will be announced later.. The after-dinner speaker is Mr. C. H. Hopper, of the Canadian Westinghouse Co.. Commercial companies are again reminded that whether they have availed themselves of becoming members of the association or not, they will be welcomed at the convention. Members and visitors are requested to register during Thursday morning at the Hydro Offices, University Avenue.

Water Powers of the Province of Quebec—Hamilton Falls a Million H. P.

The Department of Lands and Forests of the Province of Quebec have issued a booklet describing the water powers of the Province of Quebec, written by Arthur Amos, chief engineer, Hydraulic Survey. This information was gathered for the purpose of giving the Dominion Royal Commission, which sat in Quebec, in November, 1916, a general idea of the importance of the water powers of the province, and of their remarkable location throughout its extent, and is a translation from the French, in which the information was originally compilled. It is stated that a recent census of the operating hydraulic plants of the province has revealed the fact that the total capacity of these plants exceeds 825,000 h.p. The total horse-power of the province is probably somewhere in the neighborhood of 6 or 7 million, much of which, of course, is not so located that it can be of any immediate commercial use. As an example, there is the great fall of the Hamilton River in the extreme northeastern portion of the province, which is rated at 300 feet, but from which, according to Mr. Thibaudeau, C.E., who explored this region in 1914, a head of 960 feet, and a capacity exceeding one million h.p. could be obtained by means of a dam and diversion canal, through a chain of communicating lakes in the vicinity. The following conclusions, summing up the water power situation in the province, are of interest:

The Province of Quebec is well provided with water-powers, but most of the falls are not of great height.

It should be observed that the sites where considerable energy (over 50,000 h.p.) can be produced, and still in a natural state, are remarkably situated for supplying the wants of the principal cities. Thus, for the vicinity of the city of Ottawa, we find the Chats falls and other rapids of the Ottawa river, for Montreal, besides the sources of energy now in use, the rapids of the St. Lawrence at Coteau, Les Cedres, and also the Sault-Saint-Louis; for Trois Rivieres and Quebec, the water-powers of the river St. Maurice, regulated by the largest reservoir in Canada, at La Loutre; for the Saguenay and Chicoutimi region, the rapids of the Grande-Decharge; lastly, for the Lower St. Lawrence, the falls of the Manicouagan and of the River Aux Outardes.

The south shore of the St. Lawrence is not so well provided, but it may be said that for the more densely populated regions, that is to say, the Eastern Townships, the St. Francois River, when regulated, will suffice for the demand, for a good many years.

The advantages of the lake Saint-Jean region and, particularly those of the Grande-Decharge should be especially emphasized. The natural conditions there are remarkable; the available undeveloped power is enormous; ocean navigation is possible almost as far as the spot where the works could be erected; there is no lack of labor and a railway connects the district with Quebec and Montreal, as well as a steamer line.

Lastly, we would say that the Quebec Streams Commission, acting under the jurisdiction of the Provincial Government, has taken in hand the improving of the regimen of rivers on which industries are established. Great advantages are anticipated from this policy and everything tends to show that, within the next decade, the work of this body will produce all the good results expected from it.

Electric Steel Furnaces in England—Heroult Furnace Finds Widest Use

In a recent paper at the Staffordshire Iron and Steel Institute, F. J. Moffett gave the following figures relating to electric furnaces installed in the United Kingdom at the end of 1917. Of the total (140) nearly one-half were in the Sheffield and Rotherham district, where there have been such vast extensions in the iron and steel industries and in the applications of electricity in connection therewith consequent upon munitions and shipbuilding demands:

Heroult	46	varying from 1½—10 tons
Greaves-Etchell	31	varying from ½—12½ tons
Electro-metals	27	varying from 1½—10 tons
Rennerfelt..	8	varying from ¾— 2½ tons
Stobie..	6	varying from 5 —15½ tons
Other makes..............	22	

Mr. Moffett said that the arc furnace had established its superiority from a commercial point of view, the induction furnace now being very rarely used in England for steel refining.

The standard sizes of furnace with the transformer capacity and the approximate units per ton of finished steel were:

Size.	Transformer capacity.	Kw.h. per ton
2800 lb.	300 Kw.	850
2½ tons (long)	500 Kw.	800
5 tons (long)	800 Kw.	750

The decrease in the kw.h. per ton does not go on indefinitely; when the capacity of 15 tons is reached, the kw.h. per ton appear to reach their minimum value.

Congratulations to Lieut. M. B. Hastings, M. C.

The welcome news has just recently reached Toronto friends that Lt. M. B. Hastings has been awarded the Military Cross for conspicuous bravery on the field. This information is contained in a letter to Mr. A. H. Winter-Joyner from which are quoted extracts. It will be noted that Lt. Hastings has lost nothing of his old-time modesty. Congratulations on his splendid showing. The letter runs as follows:

Cambrai, Oct. 9, 1918.

We have just captured Cambrai and three hours ago the old Hun was here. He isn't now and our troops are over a thousand yards the other side of the city. My old battalion (4th C.M.R's.) mopped up the city. The artillery barrage was a hummer. I think if Fritz could get behind our lines on a sight-seeing expedition to see what we have, he would quit right away.

Well, people, I'm in a hurry because we are going right on. This is the greatest experience of a generation, if you don't weaken.

Now, Alf., you know how modest I am, but to-day I got the surprise of my life when the O. C. sent a list to me showing the decorations awarded by the King for the battle of Amiens. I took the Mobile Mortars over with the Infantry, but just had a good time, of course, lots of excitement, but I never lost out on beating anyone into a shell-hole. By jove, I'm glad I can yet move fast. However, I don't know why, what for, or anything else, but the orders actually read "Lt. M. B. Hastings awarded the Military Cross." I must have been shooting the Hun an awful line of Bull, Eh!

However, it's encouraging to be decorated, although nothing was farther from my thoughts. I didn't even know I was recommended for the M. C. and I can hardly believe it. I will be invested with the medal by the King next time I'm on leave in London. It will be nice to have A. H. W. J. Ltd., represented on the list of decorations as well as the list of soldiers, Eh!

Later I was called back to-day and the O.C. subjected me to the awful ordeal of standing in front of the parade, while he made some foolish remarks and pinned the ribbon on. However, I guess it's true now, it's beginning to seem real.

An interesting sequel to this is contained in a note just received by friends of Capt. Gordon C. Patterson, also of M. C. fame, who writes from Bruhl, Germany, under date December 11, 1918:

"Here we are in Germany only a few miles from the Rhine. This is a picture of the "villa" in which our office and mess are. Bruhl lies on the outskirts of Cologne. The day before yesterday I was through Cologne on one of our staff cars and crossed the Rhine, on the Hohenzollern Bridge, returning by the South Bridge. Cologne is quite a wonderful city (650,000 inhabitants); the Cathedral is a fine building. You may realize that my knowledge of German is an invaluable asset just now. I will go forward with another staff officer to-morrow morning and we will ride across the Rhine and have a look at the territory on the other side.

"When you realize that our troops have covered 300 miles on foot since the armistice was signed; you will see that they have not been exactly resting. But everything has been well arranged and the progress has been gradual but steady. After the hardships of the war, it is great—I can't hope to depict how happy our fellows are, to be doing this instead of fighting. This Eifel region between the Rhine and Belgian frontier is one of the most beautiful in the world, and touring about on a car has been a great contrast to the life of the last three years. A tramway runs regularly from here to Cologne and it is only a short trip to the heart of the city."

Bell Telephone System Announces Perfection of Invention Which Admits of Five Conversations Simultaneously Over a Single Pair of Wires

The Bell Telephone System have announced the solution of one of the most difficult problems in telephony and telegraphy. This problem has been before telephone and telegraph engineers almost since the existence of the telephone and the telegraph. It has remained, however, for the engineering departments of the American Telephone & Telegraph Company and the Western Electric Company working together to solve it. Its solution has required the very highest inventive and engineering skill and the technical staff who have worked on it so successfully are entitled to the very greatest credit for their work.

The practical demonstration of this system was made upon a pair of wires extending between Baltimore and Pittsburg. Everyone knows of the great demands which have been made by the Government and the public for long distance service since our entry into the war. Naturally, the demands for long distance business in and out of Washington were greater even than the demands elsewhere. It was, therefore, decided last spring when this system was ready for practical trial to make it in such a location that the additional facilities provided would be available in assisting in carrying the war load of long distance traffic in and out of Washington.

A pair of long distance wires extending from Washington to Baltimore and thence via Dallastown to Pittsburg was selected for the experiment. The multiplex system was applied only to that part of the circuit extending between Baltimore and Pittsburg, as for the part between Baltimore and Washington additional wires were available in the cable. Before applying the new system the pair chosen between Baltimore and Pittsburg was operating as follows: In addition to carrying a telephone circuit of the usual type each wire of the pair was equipped with composites for duplex telegraph working and, further, that portion of the circuit from Baltimore to Dallastown was combined with another pair into a phantom telephone circuit. Without disturbing the working of any of these arrangements, by means of our multiplex system we superimposed on the wires in question four additional telephone circuits together with the complete signalling arrangements necessary to operate them. Both the talking and signalling on these new circuits provided by means of the multiplex were as good as the original telephone circuit provided in the ordinary way. These circuits were placed in regular service during October of this year being terminated on the toll switchboards at Washington and at Pittsburg in the usual manner and being as far as the operators were concerned exactly similar to ordinary telephone circuits. Since October they have been used interchangeably with the regular telephone circuits in handling the traffic and this experience showed in actual service that the new circuits were as good as the circuits provided by the usual plan of working, a result which we had confidently expected from our earlier tests.

It is difficult to explain in non-technical language how it is possible to cafry on five telephone conversations simultaneously over a single pair of wires. It is necessary to send over this pair of wires five different electric currents at the same time and to provide means so that at the ends of the pair of wires these currents may be completely separated from each other so that each current coming from one particular telephone at one end may go to a particular telephone at the other end, although on the toll line the five currents have all been mixed together The problem is to so modify each current before it goes on to the multiplex part of the circuit that each current while preserving its ordinary characteristics has imposed upon it a new characteristic which will enable the apparatus at the receiving end of the circuit to distinguish the currents from each other. This is done by combining each ordinary telephone current with a carrier current of definite higher frequency The frequency or the wave length of each of the carrier currents is different from that of the other carrier currents used on the same pair of wires and is adjusted to the separating devices at the distant end of the line.

The underlying principle may be illustrated by considering a composite photograph of five individuals. Given such a composite photograph of the ordinary kind it would obviously be impossible to derive from it the picture of each of the five individuals going to make it up. If, however, the composite photograph had been made up in five different colors the picture of each individual being in a different color, it would then be possible, by looking at the picture through colored glasses to see any one picture, separate from the others. If red glasses were used the picture printed in red only would be seen; if blue glasses the picture in blue, etc., although when looking at it in the ordinary way all of the pictures would be seen together and only the combination would appear. As the tint of each picture serves as a means of differentiating it from the others so the frequency of the carrier currents serves to differentiate each of the conversations in the new telephone multiplex.

Naturally to accomplish these results considerable amounts of apparatus are required at the terminals of the multiplex line, and there is also required changes and rearrangements in the wires themselves. It is for this reason that the system, while physically applicable to wires, either long or short, is economically limited in its usefulness to long wires. On subscribers' lines or on short local or suburban trunks its costs and complications would not be justified. On long toll wires, however, it has without doubt an important field of application.

When in the future the history of the development of the telephone and telegraph art is written, our new multiplex telephone and telegraph system will occupy a most prominent position, both on account of the skill and the ingenuity which have been shown in its solution and the results which, as years go by, will arise out of its applications.

I am glad here to have the opportunity to express my appreciation of the brilliant work of hundreds of the men on the technical staff of the Bell System whose combined efforts have produced the multiplex telephone and telegraph system the success of which has recently been so strikingly demonstrated.

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*By Bancroft Gherardi, Acting Chief Engineer, American Telephone and Telegraph Company.

The O'Brien Power, Pulp & Paper Co., Ltd., with a capital stock of two million, five hundred thousand dollars, takes power to develop, operate and maintain water powers for the manufacture of electric power, and the right to sell and distribute any surplus power in the county of Temiskaming, Province of Quebec.

During the past year the earnings of the Marconi Wireless Telegraph Co. of Canada advanced from $104,929 to $114,953, the balance carried forward being $198,414. Mr. J. W. Greenshields, K.C., succeeds Mr. A. Allan as president, Major Thomas Robb being appointed managing director.

In connection with a by-law passed by the town of Alvinston, Ont., to purchase the plant of the Alvinston Power Company, as noted in our last issue, a quantity of material will be required by the Hydro-electric Power Commission in connection with remodelling the plant.

Power-Factor Clauses in Contracts

U. S. Practice to Charge on Maximum Demand—In Canada According to Average Power-Factor

Only in very recent years have central stations and power supply companies in general come to realize that one of the greatest enemies of efficient operation is a lower power factor. Or if its full significance has been realized it has been looked upon as a necessary evil. Certain customers' loads had, of necessity, a low power factor, over which, it was conceded, the power supply company had no control. Gradually, however, it has come to be realized that by a close co-operation between the company and the consumer, some, at least, of the difficulty can be remedied. And so it has come about that the responsibility of maintaining a fair power factor is now frequently placed at the door of the consumer, the endeavor sometimes taking merely the form of an educational campaign, but at other times, the more tangible and, we believe, more effective form of a penalty clause which the customer may incur, or not, in proportion as he uses care in the utilization and distribution of his power requirements.

The power factor clause takes various forms which will, no doubt, become more or less standardized as the situation clarifies. However, at the moment, they are legion and a most interesting review of the wording of the clauses, as used by various companies, is contained in a paper by Mr. Will Brown, in a recent issue of the Electrical World. Mr. Brown has used examples from both Canada and the United States and writes as follows:

Formerly power systems were built on a larger scale than the market at the time required, consequently their problem was to build up a load for their generators. At the present time, however, the demand for power has outrun the supply, and the acute conditions caused by low power-factor have come on in some cases very rapidly.

Power-factor regulations are by no means a new thing. They have been carried in contracts by different companies throughout this country and Canada for several years, but very seldom indeed have they been rigidly enforced. Questions involved so much explanation to the power customer and the whole thing was so complicated from the standpoint of accurate metering that the clauses soon became "dead letters." They did, however, serve the purpose of a club in the hands of the power company to enforce reasonable power-factor from the customer. It seems to be the opinion of many central station men that power-factor penalty clauses can only be used in this way, and that there can be no accurate method of grading rates according to power-factor maintained.

Opposed to this view are many prominent central station managers in this country and Canada, who claim they have proved by experience that they can accurately measure the average power-factor of a customer's load and charge on this basis. They claim that the matter of power-factor, although a very different thing from load-factor, is just as important in basing alternating current rates.

The case resolves itself to this: There are power consumers who do maintain good power-factor. There are consumers who do not maintain good power-factor, but who will make a reasonable effort to better their conditions if proper inducements are made. There is a third class of consumers who either by choice or necessity will not make an effort to better power-factor conditions. Is it fair for the central station to make the good customer carry the burden imposed by the bad customer?

Various opinions have been expressed on this subject, some of which are given here. The following is an extract from a recent report of the Canadian committee on rate research, prepared in view of the shortage of power and the high cost of machinery to carry increased demands:

> Whereas in the past power-factor clauses have not been vigorously applied, nowadays nearly all companies are requiring the customers to keep their power-factor within reasonable limits at all times and to pay for any deficiencies. The question of the measurement of power-factor as to whether same should be computed to the time of maximum load of the customer's installation or to the time of maximum load of the company's system, or whether the average power-factor taken by the customer of the whole period of his operation should be taken as the determining factor, is not yet standardized.

The committee of the Canadian Electrical Association on commercial light and power sales says:

> The power shortage has called to the attention of the companies suffering from it the necessity of being much more careful in their sales of power and the conditions of sale, among which perhaps the most important is the regulating of power-factor. In the past, owing to loose power-factor conditions and non-enforcement thereof, power lines have become encumbered with motors of excess capacity or of improper voltage, or improperly repaired, with the result that many companies were supplying motor loads at a very low power-factor, materially decreasing their line capacity, their generating station capacity and transformer capacity, all of which is so urgently needed at the present time.
>
> Most companies throughout the country are now strictly enforcing their power-factor regulation clauses, or writing in new power-factor clauses in their new contracts, with the result that the users of power, owing to penalties imposed for poor power factor, are readjusting their equipment to operate at a proper and reasonable power-factor, which has worked very much to the benefit of the central station and of the consumer.

The Southern Wisconsin Power Company specifies that where the power-factor is below 90 per cent. it will add to the number of actual kilowattt-hours an amount sufficient to make the total kilowatt-hours equal to 90 per cent. of the total of the apparent kilowatt-hours.

This is an interesting clause because of the fact that it actually charges on the basis of kilowatt-hours at a specified power-factor. Nearly all of the power-factor clauses relate to the maximum demand charge entirely and ignore the energy charge.

Typical Power-Factor Clauses.

The following are some typical clauses from power contracts:

> **Cleveland (Ohio) Electric Illuminating Company.**—When the current supply is alternating and the greater part of the load is power and the billing demand exceeds 75 kw., the company reserves the right to test the power-factor of the consumer's load, and if the average power-factor is greater than 75 per cent. then the demand shall be reduced in accordance with the following formula: Billing demand $=$ kilowatt demand as measured $\div$ average per cent. power-factor $\times$ 75.
>
> If the average power-factor is less than 60 per cent., then the demand shall be increased in accordance with the following formula: Billing demand $=$ kilowatt demand as measured $\div$ average per cent. power-factor $\times$ 60.
>
> The company will make without charge a power-factor test at the consumer's request once a year, if his demand exceeds 75 kw. By power-factor is meant the average power-factor under normal operating conditions.
>
> **Niagara, Lockport & Ontario Power Company.**—The purchaser shall at all times take and use the three-phase power in such manner that the power-factor will be as near 100 per cent. as possible, but whenever at any time the current is not taken at 100 per-cent. power-factor and the power-

factor is less than 90 per cent., then the basis of charge for that day, in lieu of the highest one-minute demand, shall, if the power company so elect, be considered as 90 per cent. of the maximum kv.a. taken for a period of one minute divided by 0.746. This amount shall never be considered as less than the fixed horse-power agreed to be purchased and paid for.

Northern Indiana Gas & Electric Company.—The primary charges will be increased by 1 per cent. for each 1 per cent. the power-factor on the entire load decreases below 75 per cent. at any time. If the power-factor on the entire load, owing to lagging current, is maintained at 95 per cent. or better, a discount of $1 per kilowatt per year will be made from primary charges.

Harrisburg (Pa.) Light & Power Company.—The consumer shall at all times take and use power in such manner that the power factor shall be as near 100 per cent. as possible, but when the actual power-factor is less than 80 per cent., then the demand to be charged and paid for shall be obtained by multiplying the demand shown by the meter at the time of measurement by 80 and dividing the product thus obtained by the actual power-factor.

Milwaukee (Wis.) Electric Railway & Light Company.—The customer agrees that when possible the average power-factor of the equipment to be supplied with electric energy hereunder shall not be less than 80 per cent. Should the power-factor of the electric current taken by the customer at any time be less than 80 per cent., then the maximum demand as specified herein shall be ascertained and determined as 0.00080 of the product of the maximum average amperes taken by the customer for fifteen consecutive minutes multiplied by the volts and the factor 1.73.

Duquesne (Pittsburgh) Light Company.—Where the power-factor of the customer's load is below the sub-joined schedule of permissible power-factors the company reserves the right to increase the demand as estimated or measured in the ratio that the actual power factor as determined by test bears to the permissible power-factor:

75 p.c. power factor for demands from 10 kw. to 50 kw.
80 p.c. power factor for demands from 50 kw. to 250 kw.
85 p.c. power factor for demands from 250 kw. to 1000 kw.
90 p.c. power factor for demands above 1000 kw.

Companies Controlled by the United Gas Improvement Company (Philadelphia).—The primary or demand rate for any month shall be increased 1 per cent. for each 1 per cent. the lagging power-factor on the consumer's load is at any time during such month below the following: 75 per cent. at the time of maximum demand, 70 per cent. at the time of 75 per cent. of maximum demand, 65 per cent. at the time of all other demands.

If the lagging power factor on the consumer's load is maintained at all times during the month at 95 per cent. or better, 10 cents per kilowatt per month of demand will be deducted from the primary or demand charge.

Philadelphia (Pa.) Electric Company.—We penalize a customer for a power factor below 80 per cent., correcting the stand-by charge to 80 per cent. basis.

Toledo (Ohio) Railways & Light Company.—The maximum billing demand shall be determined from actual measurements of the customer's demand and a consideration of the power factor at which these measurements are taken and shall be calculated by multiplying the greatest integrated fiften-minute demand by 80 per cent. divided by the actual power factor at which the demand measurements are taken.

Basing Charge on Average Power-Factor.

In all of the above contracts the maximum-demand charge only is involved. In Canada, however, central stations have actually been basing their energy charge upon the average power-factor of the load. The following clauses are examples of Canadian practice:

Montreal Light, Heat & Power Company.—The minimum power factor of the electrical energy taken shall not be less than the following:

Motors and apparatus of 3 hp. rated capacity and less, 70 per cent.; over 3 h.p. and not exceeding 5 h.p., 75 per cent.; over 5 h.p. and not exceeding 10 h.p. 80 per cent.; over 10 h.p., 85 per cent.

If the power factor of the electrical energy taken is found to be less than as specified above, then consumer shall pay for the electrical energy taken on the basis of the minimum power factor so specified.

Southern Canada Power Company, Ltd.—If the power factor of the electrical energy taken is found to be less than 85 per cent., then consumer shall pay for the electrical energy taken on the basis of 85 per cent. power factor.

Toronto Power Company.—The purchaser agrees to use the three-phase electrical energy in such a manner that the current values, as determined by suitable current indicating or recording devices, for the three phases shall be balanced each with the others to such an extent that the difference between the lowest and the highest coincident current values shall not be greater than 5 per cent. of the lowest current value; and that whenever a current unbalance providing a difference in excess of 5 per cent. shall occur in the manner hereinbefore stated, then the amount of power may at the option of the power company be taken as 90 per cent. of 1.73 times 95 per cent. of the highest of the three current values multiplied by the highest phase voltage coincident with the current value used.

The current and voltage are to be determined by commercial instruments meeting the requirements of the Department of Inland Revenue for Canada.

The purchaser agrees to use the three-phase electrical energy in such a manner that the power factor shall be 90 per cent., and that whenever the said power factor shall be less than 90 per cent., then the power company may take 90 per cent. of the kv.a. as the rate of taking power and use the same in determining the demand rate or the energy consumption.

Fundamental Difference Between the Two Clauses.

The basic differencesbetween these two types of clauses should be carefully noted. In one case the maximum demand as metered at infrequent intervals varying from once a month to once a year is increased according to the amount of power-factor drop below a certain specified minimum. In the second case every kilowatt-hour of energy as metered by the watt-hour meters is increased in proportion to the amount of power-factor drop below a specified minimum. It is plain that while the former method could be enforced with a fair degree of accuracy, it would not in any way take into account the average power-factor of the customer's load.

It may be argued that the central station is only interested in knowing the customer's power-factor at full load because at periods of light load the system could be operated at lagging power-factor without great inconvenience. But it does not always follow that the periods of light load of the consumer coincide with periods of light load on the system. They may occur at the time when the system load is at the peak.

Mr. G. M. Bertram, appointed Sales Manager for the Lincoln Electric Co.

The Water Powers of New Manitoba

Government Investigating Supply for Mining Operations and Other Demands—Four Rivers of Considerable Capacity

An interesting pamphlet has just been issued by the Natural Resources Intelligence Branch of the Department of the Interior, entitled "The New Manitoba District, Its Resources and Developments." A chapter relating to water powers is of special interest to our readers, and we reproduce the following extracts. It must be remembered that these remarks apply to the new area which was added to Manitoba in 1912, comprising 178,000 square miles, frequently spoken of as New Manitoba. The data for this chapter was compiled by C. H. Atwood, of the Dominion Water Power Branch, Chief Engineer in charge of Alberta and Saskatchewan Power Survey.

Water Powers.

Owing to its remoteness from any regular line of transportation, it was soon realized that if mining operations were successful in the new Mineral Belt, a supply of hydro-electric power, sufficient to meet all possible demands, was one of the most important requirements of the district. This being the case, engineers of the Dominion Water Power Branch of the Department of the Interior were directed to investigate the district, and during the summers of 1915 and 1916 made reconnaissance power surveys of the Grass and Burntwood rivers to the east, and of the Sturgeon-Weir and Churchill rivers to the west and north. The results of these investigations showed that the power sites lying in closest proximity to the Mineral Belt and capable of producing large quantities of power (blocks of 5,000 horse-power and over) were Birch rapids on the Sturgeon-Weir river and Island falls and Bloodstone falls on the Churchill river.

At this time, owing to the lack of stream flow records, no reliable estimate can be made of the continuous power output of these sites. The discharge measurements obtained during the power investigations are the only records available to date (January, 1918). However, the Department, realizing the need of winter records, has despatched an officer of the Irrigation Branch to secure as many discharge measurements as possible this winter on the Sturgeon-Weir and Churchill rivers. These measurements, while not sufficient, will nevertheless provide data from which an approximate estimate of the continuous power available on these two rivers can be made.

The lack of information makes it difficult, at the present time, to summarize the water-power prospects in this district in a satisfactory manner but, in order to render the general situation more clear, a brief outline of the power possibilities on the individual rivers investigated is appended. The power estimates are subject to revision as further data becomes available.

The Burntwood River.

The power investigation on this river covered the reach from Split lake up to Gate rapids, a distance of 140 miles. The river flows, generally without apparent current, through a well-defined valley, and for the most part the banks are of clay. The channel is wide, often expanding to lake dimensions, and sand bars or flats are not uncommon.

In the reach between Split lake and Three Point lake there is a total drop of 237 feet, concentrated for the most part at six falls and ten rapids. The most important power possibilities investigated were: Manaza falls, with an almost vertical drop of 26 feet; Jackpine falls with a drop of 29 feet; Taskinigup falls, with a descent of 53 feet; and Wuskwatim falls, with a total descent of 24 feet. The two latter falls are located only one-half mile apart and might well be combined in one power scheme. Wuskwatim lake affords a large storage capacity, and is conveniently situated.

Discharge records were obtained during the survey, and from these it is estimated that the minimum flow is approximately 500 second-feet, and that for nine months possibly 750 second-feet can be obtained. The power available, as shown in the following table, is based upon this estimated flow and the head given at the sites, assuming a turbine efficiency of 80 per cent.

Table I.

Power site	Head in feet	Discharge in second-feet Minimum	Dependable for 9 months	Horsepower Minimum	For 9 months
Manaza Falls	26	500	750	1,182	1,800
Jackpine Falls . ..	29	500	750	1,318	2,000
Taskinigup Falls ..	53 } 76	500	750	3,455	5,200
Wuskwatim Falls .	23				

The Grass River.

Grass river forms a part of the great Nelson River drainage system and lies entirely within the province of Manitoba. From its source in the Cranberry lakes, near the Saskatchewan-Manitoba boundary, the Grass river flows in a northwesterly direction for about 275 mile before joining the Nelson, a few miles above Split lake.

The drainage basin comprises an area of approximately 6,400 square miles, and the general relief of the whole district is low and unpronounced. The rock is of Laurentian formation, but in many sections is overlain with considerable depths of clay or drift, and is claimed to be very suitable for agricultural settlement. The entire basin is more or less wooded with spruce, poplar, and pine, very little of which is of sufficient size for building purposes, though the spruce and poplar is large enough for pulp manufacture.

The river passes through many lake expanses, several of which should afford satisfactory storage. Hekusko lake with an area of 70 square miles, Sandy lake with an area of 12 square miles, Setting lake and adjoining lakes with a combined area of 85 square miles, can all be utilized and would provide a fairly complete regulation of the water supply.

The investigations covered that portion of the river lying between Reed lake and Split lake, or approximately 250 miles. In this reach there is an aggregate drop of 365 feet, occurring mainly at twenty-four rapids and nine falls. It is not economically possible to utilize this entire drop for power purposes, but at six sites it would be possible to concentrate 270 feet. The following table gives the location

Table II.

Power site	Head in feet	Discharge in c.f.s. Estimated minimum	Dependable for 9 months	Horse-power Minimum	For 9 months
Wekusko Rapids .	55	100	150	500	750
Second Falls . ..	42	150	225	570	905
First Falls	37	175	265	590	900
Lynx Falls	54	350	525	1,720	2,577
Sandy Falls	46	350	525	1,465	2,200
Fifth Rapids	36	400	600	1,310	2,000
Total	..	...	...	6,155	9,332

of these six sites, estimated minimum flow, available head, and the power output at 80 per cent. turbine efficiency. Owing to the insufficient data relating to run-off, no attempt has been made to estimate the power output with proper storage regulation. It is apparent, nevertheless, that with the large drainage area, the mean discharge should be considerable and that power development at any of the sites along the river will be greatly improved by the utilization of the storage opportunities.

The Sturgeon-Weir River.

The Sturgeon-Weir river drains the large system of waterways lying in northern Saskatchewan, including Deschambault, Wood, Pelican, and Mirond lakes, and empties into Amisk (Beaver) lake which lies about 60 miles northwest of The Pas, Manitoba. The river from Mirond lake to Beaver lake is approximately 50 miles in length, and from Beaver lake to Namew (Sturgeon) lake, locally known as the Sturgeon river, is an additional 27 miles.

Between Mirond lake and Beaver lake there is an aggregate drop of approximately 60 feet, occurring mainly at six rapids. Of these rapids there is only one at which it is possible to develop, economically, sufficient power for the probable power demands of the Northern Manitoba mineral belt. This power site is at Birch rapids, about 17 miles below the outlet of Mirond lake and some 35 miles distant from Flin-Flon lake. At Birch rapids there is a natural drop of 11 feet, the river narrows to a width of 150 feet, and both banks, which are of granite and quite steep, rise to a height of 50 or 60 feet above the river. A head of 30 feet can easily be obtained at this point. The natural discharge of the river is insufficient to meet the possible requirements of the mining district, and it is only in conjunction with a complete system of storage and regulation, together with a possible diversion of Churchill waters at Frog portage, that 20,000 or 25,000 continuous horse-power can be made available at this site. Mirond, Pelican, Deschambault, and Burntwood lakes with a combined area of approximately 360 square miles will provide the bulk of the storage required.

The Churchill River.

The Churchill River basin comprises the watershed lying immediately northward of the watershed of the Saskatchewan and Nelson rivers, and drains into Hudson bay. The total area of the basin is approximately 114,150 square miles, the axis being practically east and west, extending westward to the height of land dividing it from the Athabaska. Innumerable lakes of varying size occur throughout the whole basin, and the river itself to within 80 miles of its mouth may be described as a chain of lakes linked up by short stretches in which rapids and falls occur.

Throughout its entire length the Churchill provides numerous power and storage sites which will warrant very careful investigation. Certain of these power sites may possibly play a most important part in the development of the new Mineral Belt of northern Manitoba and Saskatchewan. There are two power sites located within reasonable transmission distance of the mining district. These sites are Bloodstone falls, situated at the lower end of Sisipuk (Duck) lake approximately 17 miles east of Island falls, and approximately 10 miles due west of the Manitoba-Saskatchewan boundary.

At Bloodstone falls there is a natural drop of 10 feet, and a head of 20 feet can easily be obtained; this would create a pond of roughly 90 square miles. From the meagre discharge data available it appears that 27,300 continuous 24-hour horse-power can be developed without utilizing the storage available. For eight months of the year possibly 36,000 horse-power can be developed. This power site is distant about 80 miles, in a direct line from the mining district.

At Island falls, approximately 60 miles in a direct line from the mining district, there is a natural drop of 17 feet, and a head of 36 feet can be created which, under conditions of natural flow, would possibly develop between 40,000 and 50,000 continuous 24-hour horse-power. For eight months of the year possibly 65,000 horse-power can be developed

The following table briefly summarizes the present estimate of the power available adjacent to the mining district and is subject to revision as further data is received.

Table III.

Power site	Head in feet	Estimated minimum discharge in c.f.s.	Horse-power, continuous 24-hour power	Distance* to mining district in miles
Burntwood River—				
Manaza Falls	26	500	1,182	160
Jackpine Falls.	29	500	1,318	150
Tasinigup Falls 53	76	500	3,455	135
Wuskwatim Falls .. 23				
Grass River—				
Wekusko Rapids . ..	55	100	500	70
Second Falls	42	150	570	90
First Falls	37	175	570	100
Lynx Falls.	54	350	1,720	135
Sandy Falls	46	350	1,465	145
Fifth Rapids	36	400	1,310	170
Sturgeon-Weir River—				
Birch Rapids	30	7,000	20,000	35
Churchill River—				
Bloodstone Falls. ..	20	15,000	27,300	80
Island Falls	36	15,000	49,000	60

*To the northern end of Athapapuskow lake in a direct line.

Personal

Mr. Frank Down, Winnipeg and Western sales manager for the Canadian Tungsten Lamp Company, Limited, Hamilton, has been called to England, owing to the serious illness of his mother.

Mr. Wm. F. Kelly, Ontario sales manager for the Canadian Tungsten Lamp Company, Limited, Hamilton, left a few days ago for Winnipeg to call on the trade from Winnipeg west to the Coast. This trip was rendered necessary on account of Mr. Down's unexpected absence in England.

Mr. Meiji Nakoa, chief electrical engineer for the Furukawa Mining Company, Tokio, Japan, has been visiting various points in Canada and the United States investigating electric furnace practice and was recently in Toronto. Mr. Nakao, who is also a large owner of mining interests in Japan, stated that they pay a half-cent per kw.h. for hydro-electric power at the mines.

Captain Alex. Wilson, of the 42nd Battalion R. H. C., who recently returned to Montreal, was the guest of honor at a dinner tendered him at the Engineers' Club, Montreal, on January 6th, by Mr. J. S. Norris, vice-president of the Montreal Light, Heat and Power Company. Captain Wilson was formerly engineer of the electrical distribution department of the company, and he expects within a few weeks to return to his former duties there. Members of the staff of the department were present at the dinner.

Obituary

Mr. James D. Fraser, secretary-treasurer of the Ottawa Electric Railway Company, died recently. He was also secretary-treasurer of the Ottawa Car Manufacturing Co., Ltd.

Mr. Henry McKay, chief engineer of the Pictou County Electric Company at New Glasgow, N.S., met death recently by electrocution while adjusting some apparatus in the power house.

Electric Railways

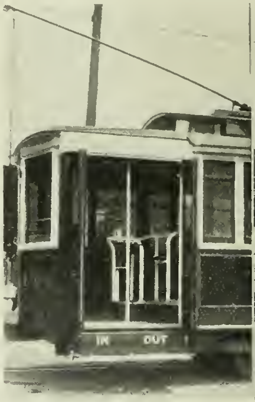
Toronto Railway Company are Equipping Their Entire System with Latest Type P-a-y-e Vestibules—Twenty Already Operating

The Toronto Railway Co., on January 6, inaugurated a modern pay-as-you-enter system on the College Street cross-town line of the city, to be followed as quickly as may be by a complete reconstruction of the rolling stock of this company throughout. The illustrations herewith are self-explanatory and indicate that the most modern ideas have been incorporated in the designs followed by this company.

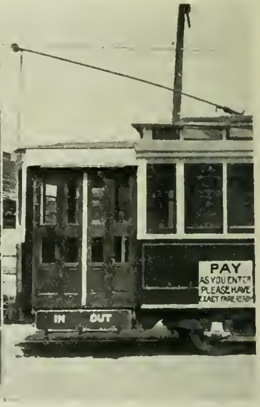
The cars already equipped with p-a-y-e equipment, some twenty in number, have a platform length of 7 feet and are the latest type of car manufactured by the Toronto Railway Co. The line drawing herewith shows the actual dimensions of the vestibule. In the same figure is also shown the platform dimensions of the balance of the double-truck cars owned by this company, which are being equipped with the p-a-y-e system as quickly as they can be turned out. These latter cars will have a platform depth of 6 ft 6½ in. Either of these cars will thus have standing accommodation for from 12 to 15 people, which should be ample to take care of those passengers boarding the car at any point, who do not have a transfer or a fare so that they may pass right into the main body of the car.

It will be noticed that the vestibules are equipped with folding doors and folding steps. These are operated pneumatically by a touch of a lever convenient to the conductor. The conductor operates in a small railed-in compartment, as shown, roughly 3 ft. long by 2 ft. wide, which is equipped with the pneumatic lever just mentioned, p-a-y-e fare-box, and a push button to signal the motorman. The push button operates a signal light in the motorman's vestibule, which is normally burning and so indicates to the motorman whether the doors are closed, trolley pole on wire, current on, etc. The motorman will not start until the signal lamps light, and throws off the power and applies the brakes when the signal light goes out.

The pneumatically controlled doors and steps respond to the motorman much more promptly than the manually operated type. Danger of the doors closing too rapidly and catching passengers in exit or boarding a car is obviated by two strips of rubber tubing attached to the doors and meeting as the doors close. Any object caught merely receives a slight pressure but no injury.



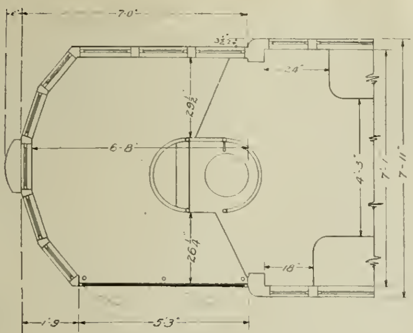
Doors open, showing Conductor's enclosure



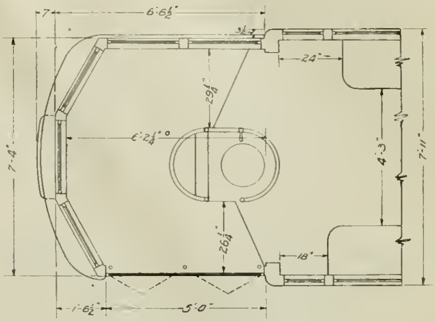
Doors closed, steps raised

It will be noticed that the usual railing bar which divides the incoming passengers from the outgoing is not used in this new type. With the bar in place it has always been necessary for transfer passengers to pass around the conductor along with the cash or ticket passengers, thus tending to congest

Latest type p-a-y-e car now operating on system of Toronto Railway Company, Toronto



Plan of vestibule, twenty cars now operating p-a-y-e.



Plan of vestibule, earlier type cars now being remodelled

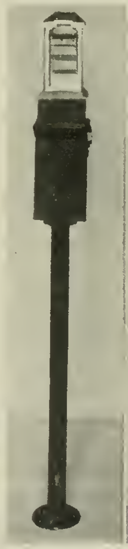
the passage and delay the schedule. With this dividing rail removed, the conductor will be able to accept transfers with his left hand and allow the transfer passengers to enter the car without passing around the fare box. This should tend greatly to diminish the length of stop at crowded points.

There are three illuminated signs on these new cars, consisting of a route sign over the front vestibule, a route sign in the second window from the rear of the car body, entrance side, and a designation sign located in the upper right hand of the front vestibule. These signs were designed and built in the company's shops. The large front route sign is particularly interesting, being fitted with a periscope arrangement which enables the operator to adjust the sign from the vestibule with absolute guarantee of the right route being indicated exactly in the center of the frame.

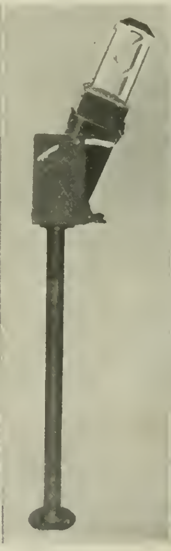
The front vestibule door moves on rollers and is manually operated by the motorman.

Another new feature about these cars is the p-a-y-e fare box. This is of the hopper type and is attached to the conductor's stand. One of the illustrations herewith shows different views of the box, which is designed by and built under the supervision of Mr. William Cox, who is in charge of fare collection devices for the company. The box is very much lighter and also very much smaller than the average p-a-y-e type of box and can be carried by the conductor or brought into the car just as readily as the old hand fare box. The box is provided with a rocking or tilting arrangement by which the conductor, with a single simple forward movement, discharges the fares from the upper platform of the box into the main compartment below. The box cannot be removed from its stand without being given this rocking motion twice in succession, which insures that the conductor cannot remove the box from the stand without going through the motion which guarantees that all tickets are safely housed in the lower or storage compartment of the box. The company look upon this box as the most satisfactory and complete that has yet been produced on any of the p-a-y-e systems on this continent. Mr. Cox has invented a number of fare collecting devices and introduced a great many improvements in existing apparatus, having made the matter of efficient and safe collecting of fares a special study for years.

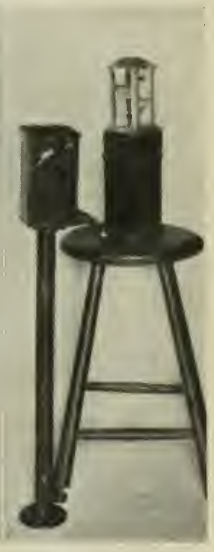
View looking toward rear end, showing Conductor's enclosure and chain gate to prevent passengers crowding exit door



Fare box in stand



Fare box tilted to discharge tickets



Fare box removed from stand

In the new cars the stove has been placed somewhat further out in the front vestibule, leaving a little more room for passengers leaving by the front door. The truck equipment on the latest type of Toronto car is Brill No. 27 K, with

4 ft. 6 in. wheel base. The motor equipment is G. E. throughout, consisting of four G. E. 80 motors, with K 35 controller. The cars are 44 ft. over bumpers, 30 foot body. They are equipped with Watson automatic fenders. The total weight is 41,000 lbs.

The new cars are the result of an investigation of the most efficiet types on this continent, the good points of which have been brought together and incorporated on the Toronto Railway system by Assistant Manager Hubbard, Master Car Builder M. P. Powers, working with Mr. W. R. McRae, Master Mechanic and Superintendent of Equipment. Mr. R. J. Fleming is General Manager of the company.

The Problem Must Be Solved—Transportation Is a National Necessity—Railway Companies Must Have Relief*

In order to suggest a remedy for the conditions facing public utilities to-day, it is essential that there should first be a thorough understanding of the problems brought upon them by the war. These problems are clearly seen by the men responsible for the continuing operation of the public utilities under the increased demands for service due to the national crisis, and became more and more apparent as the nation's industries were mobilized on a basis of maximum efficiency for the prosecution of the war. The government authorities were promptly informed that if a breakdown in the essential service of public utilities was to be averted, four phases of the situation require speedy attention:

1. Rates must be increased sufficiently to absorb the increased cost of producing the service.
2. The utilities must be relieved during the period of the war, of all non-essential and unproductive requirements, such as paving, undergrounding of wires, duplication and unnecessary extension of service.
3. Some way must be found to enable the utilities to take care of obligations maturing while the war lasts.
4. Assistance must be provided to enable the companies to finance the unavoidable extensions of service made necessary by the nation's war program.

How these problems were met is now a matter of history. That they were not adequately met is recognized on all sides. Measures of relief were meager and too slow in coming.. The needs of the industry were obvious, but no channels for immediate help were available. Proposals that offered hope were shrouded by constitutional doubts, and so one after another, the public utilities were forced into financial and operating difficulties, with the burdens of the war laid unrelentingly upon them.

It is to remove as far as possible a repetition of those conditions and to assure a safe future for the industry, and adequate service to the public that a readjustment of relationships is imperative.

One of the facts brought to the front during the last two years is that the whole structure of the franchise relationship between the public utilities and the various communities has broken down under the strain of war. The rapid increase in the cost of all material, the extraordinary demands of labor made necessary by the rise in the cost of living, the alarming decrease in the purchasing power of the dollar, have brought the industry, particularly the electric railways, face to face with bankruptcy, because no avenue of automatic escape from rising costs lay open.

Practically every industry, except public utilities whose rates are regulated by law, has been able readily to adjust its methods of doing business to meet the war demands, and the radical increases in cost of operations and of manufacture have been promptly reflected in the selling price and so on to the customer.

In all other departments of our commercial and industrial life where the economic laws of supply and demand have been unhampered and allowed free play, the inevitable increase in the cost of production has been taken care of in the perfectly normal way of increased cost to the consumer. It is only in those industries where the public has attempted to fix a just and fair price for the service rendered and where the artificial standard has been substituted for the natural one that we find this complete breakdown under war conditions.

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A tabulation of the income accounts of 388 electric railways, representing more than 63 per cent of the electric railway mileage of the United States, shows a falling off in net income of 82 per cent. for the first six months of 1918 as compared with the corresponding period of 1917. Many of the companies are facing actual operation deficit in spite of increases in gross receipts.

These facts lead inevitably to the conclusion that the present relationship between the companies and the public, as evidenced by existing franchises with fixed rates of fare, is economically unsound; that the present system of regulating rates by franchises or through commissions is admittedly not sufficiently responsive to the violent and radical changes in operating conditions which are bound to occur.

Another fact emphasized by the war is that before a company can justify an increase of its rates it must first show that for a longer or shorter period it has suffered loss under the existing rates, which loss cannot be compensated for by the new rates. In any other business the manager is able to provide against increases in cost by promptly advancing his selling price. The public utility must stagger along under inadequate rates for months until its credit is destroyed, its service impaired, its equipment deteriorated, and it has become obvious to the community that it is on the brink of destruction before its case has been sufficiently made out to justify an increase in its rate.

What are the Remedies?

The result of the extraordinary increases in the cost of labor and of material as well, coupled with the inability of the companies to increase their rates, is shown by the tabulation of operating figures of 63 per cent. of the electric railway mileage of the country, already referred to.

A careful study of these figures indicates that unless wise counsels prevail and the necessary relief is afforded electric railways in the near future, the industry, as an industry, is doomed to destruction. It needs no argument to establish the fact that no industry can continue sucessfully to function when deprived of the right to increase its rates to meet extraordinary increases in cost of operation.

What, then, are the remedies for the situation? Definite measures will suggest themselves as the problem is more thoroughly understood, but it is possible now to analyze the causes for the present situation and to suggest some of the basic principles which should control the relation of public utilities to their respective communities hereafter.

The chief difficulty has been that the viewpoint of both sides has been one of antagonism, instead of co-operation. Both the public and the companies have endeavored to obtain the greatest advantage for their respective interests, without considering the ultimate effect upon the industry or the community. The public, under the conviction that enormous profits were being realized, felt free to make one exaction after another, recognizing no interest in the public utility except the service rendered, and no responsibility for financial results. The companies, on the other hand, with no adequate appreciation of their true relationship to the public, and in some instances, it must be admitted, with reckless disregard for the future, insisted upon franchise provisions which seemed onerous to the municipalities.

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*By P. H. Gadsden, Chairman Committee on National Affairs, American Electric Railway Association.

The time has now come for a radical and thorough review of that relationship. In some way, the American people must realize that their interest in the continued efficient operation of these railways is such that it becomes imperative that they should recognize some responsibility for financial results. In some way the credit for the public must be put behind these properties in return for the class of service which it demands.

The Public is Indifferent

In view of the disastrous experiences of electric railways during the war, it is not reasonable that they will be able to attract, in the future, the private capital necessary for their further development. The fact that the public has been willing to permit this great industry to stagger on under the burdens of war, with inadequate relief in the way of increased rates, while exposed to the full brunt of the extraordinary increases in cost of labor and material, raises a question of fundamental equity and fair dealing. The public must be brought to realize that its interest in the electric railways of the country is greater than that of the stockholders or bondholders, and that if the electric railways are to continue to discharge their essential service, the public must, in some way, guarantee an adequate return upon the capital invested.

What is needed then, at this time, is a thorough and impartial study of the whole question of electric railway franchise, with the end in view of establishing the industry on a wholesome, economic basis, which will guarantee continued efficient service to the public. Such a study should be made primarily from the standpoint of the public interest—what is best for the communities served. It is a national problem and not one for the owners of the railways alone, or chiefly.

The solution must provide for adequate service to the public and a proper return upon the invested capital.

Franchise Should Provide Fair Return

The time has come for the electric railway to say to the public that they are willing to co-operate in the working of a standard franchise, which shall provide for a proper return upon the fair value of the property, and guarantee efficient service to the communities. On such a basis the matter of fares readily adjusts itself. On such a basis, the responsibility of electric railways for paving, the annually recurring question of taxation, the undergrounding of trolleys, the extension of service into unproductive territory, and numerous other questions that have caused irritation in the past, present themselves for consideration in an entirely new aspect. The experiences through which we have just passed have impressed upon the public mind the fact that additional and unnecessary burdens imposed upon the electric railways must logically and inevitably be reflected, sooner or later, in the rate of fare, or in the impairment of the service rendered. With this fact established, the question whether the entire cost of the transportation should be borne by the passenger, or whether a certain part should not be absorbed as a community charge, can be fairly considered on its merits. It is in this spirit that we must approach the consideration of this important question

The Public Means To Be Fair—But They Must Be Told the Facts

Just as I was about to reach for my coat and hat the fellow said that another thing he had intended to speak about was the unfairness of the public. That was such an interesting topic that I again picked up my wrinkled napkin, ordered another cup of black coffee, and waited for him to make some point that I could dispute. But there was no chance for an argument. He is a member of one of America's big public utility organizations—a street car company, in fact. He cited the 2 cent and 4 cent and up advances in the prices of the various little things that we used to pay 5 cents for. He mentioned some of the 4 cent articles that are now 6 cents and the 2 cent things that are now 5 cents; and then he got right down to the cent and mentioned how even the newspapers had increased their prices 100 per cent. It was all fair and just, as he said, but—and here's where he was sparring for a combat—but street car fare is still 5 cents in most cities.

I suppose I'll be accused of plutocratic leanings because I agree with him. But what could I say? There's no chance for an argument so far as I can see. Carfare is only 5 cents, it was 5 cents twenty years ago when street cars didn't carry us one-third as far for 5 cents as they do now—and in New York it will be 5 cents twenty years hence, I believe.

The trouble lies in the fact that public utilities are the tools of politicians. If politics—but why start an argument that never would end?

Unfairness of the public is what the man started to discuss. He says the public condemns the street car company without a hearing. Sure—I know that, as does everybody else. That isn't because of the unfairness of the public, but it's due to the public's blissful ignorance. The public knows nothing about the street car company's troubles because the street car company doesn't make a confidant of the public. How? By advertising. That's the way to get a hearing nowadays.

Public utilities, like some other big interests, rush into print only at the last moment, when some calamity is about to befall them. Then they always have to make a sort of plea for the defense argument, wherein the community is the plaintiff. The public is the community and it stands by its guns. It doesn't realize the good that the defendant has done because it has heard only the bad. Talk to it honestly—tell it the truth—and the public is the fairest animal on earth.—Advertising and Selling.

Storage of Lake Brule

The Quebec Streams Commission have awarded a contract for the construction of a storage dam at Lake Brule, ten miles from Beaupre, P. Q., to the Laurentian Power Company, at a cost of $50,000. The plan is to construct three dams, a wooden crib dam filled with stone, and two small earth dams. The length of the wooden dams at the crest is to be 225 feet. The structure will provide additional water power for the Hydro-electric plant of the Laurentian Power Co.

The American Telegraph and Telephone Company have announced the invention and development by the technical staff of the Bell system of a practical system of multiplex telephony and telegraphy which will greatly increase the carrying capacity of long distance telephone and telegraph wires. By the new system, four telephone conversations over one pair of wires can be carried on simultaneously, in addition to the conversation carried on ordinarily, making five messages in all. One pair of wires can also be utilized for forty simultaneous telegraph messages.

The Contractor-Dealer

Toronto Electrical Contractor-Dealers Take a Night Off to do Honor to Their President, Mr. Kenneth A. McIntyre—Large and Enthusiastic Representation Present from All Sections of the Trade

The January monthly meeting of the Toronto Section of the Ontario Association of Electrical Contractors and Dealers was held in the King Edward Hotel, on the evening of Tuesday the 7th, and took the form of a complimentary dinner to the president, Mr. Kenneth A. McIntyre. Mr. Harry Hicks, vice-president, occupied the chair.

These meeetings are now open to the whole trade and there was a goodly representation of manufacturers, jobbers, central stations, and inspectors, in addition to a practically full attendance of contractor-dealers. The regular business occupied only a few minutes and consisted chiefly of the approval, clause by clause, of the final agreement with the employees, given below. The balance of the entertainment consisted of solos, choruses and brief addresses. Toasts were proposed to "The King," and "Our Guests," the former by Mr. H. H. Couzens, general manager Toronto Hydro, and the latter by the Chairman, responded to by Mr. H. F. Strickland, chief electrical inspector for the Province. A final toast to the "Electrical Contractor-Dealer—a bigger, better and more prosperous merchant in 1919," brought a reply in the form of a good story from Mr. Harry Rooks. In addition to the music (?) supplied by the banquetters themselves, a number of solos by Mr. Hamilton Gardner added very materially to the enjoyment of the evening.

Considerable interest was aroused—and there was much favorable comment too—on the issue of "The Booster," distributed during the proceedings. A sheet of this kind can do much to maintain the interest of the members and especially if all the members lend a hand in its preparation. Some extracts are printed elsewhere. The Exchange Sheet, indicating equipment and supplies for sale or exchange among the members of the association, also gives promise of usefulness.

The crowning event of the evening was, of course, the presentation of an illuminated address to Mr. McIntyre, expressing the appreciation of the association members for the splendid organization work he had done during the past year. The address was read by Mr. Frank T. Groome, and presented by the secretary, Mr. J. Everard Myers, to Mr. McIntyre, who made a characteristically earnest and eloquent reply. The presentation came as a complete surprise to Mr. McIntyre.

Extracts from the Booster

Issued in the interests of the Ontario Electrical Contractors and Dealers.

The war is over, and in our electrical field there are no more war orders, either direct or indirect, and we must again reach out after regular construction, which in due time will spring to life.

Above all, there must not be a break in prices or a general season of price-cutting. If there is, thousands will be lost and serious trouble ensue. No man, be he ever so versed in conditions to-day, can tell just how things are going to jump. We all, however, can bank on wonderful days ahead in the electrical field for all who have sense enough to keep their heads during the period of shifting gears, so to speak. We must all be fair to our employees and competitors, and they in turn must be fair with us.

The wonderful spirit of co-operation, so splendidly displayed during the war, must continue to grow even more.

The Goodwin plan seemed to suit the Canadian General Electric Co. They joined as Associated Members right away, and we have an application from the Northern Electric. Come and meet our new associates.

Send in list of items that are eating their heads off on your shelves, and we will try and sell them for you. This service is free. Let us sell your dead stock. This sheet will fit your folder, and will be issued monthly if the members make proper use of its service columns. It's up to you!

The Ontario Association of Electrical Contractors and Dealers—Toronto District Working Rules

1. Adopted by the Toronto District of the Ontario Association of Electrical Contractors and Dealers, for the guidance of its members, on January 9th, 1919, in force from January 20th, 1919, and agreed to by Toronto Local 353, I.B.E.W. These rules are to be posted in the shops of the members.

2. Eight hours' labor shall constitute one day's work, except on out-of-town work, which shall be ten hours. All labor over eight hours per day, except as above, shall be paid for at the rate of one and one-half hours' pay for each hour's work until twelve midnight, after which double time until relieved; work performed on Sunday and legal holidays shall be paid for at the rate of double time. Saturday to be a half-holiday; Saturday work between 12.00 noon and 5.00 p.m. to be paid for at the rate of time and one-half, and double time thereafter until relieved.

All men shall be on the job, ready to commence work, at the regular hours for starting work, which shall be between 8.00 a.m. and 5.00 p.m. When workingmen are required to report at the shop, they shall report not later than 7.50 a.m., and shall be ready to receive orders or supplies. Failure to comply with this shall result in a reduction in pay for the time lost and, if the men are instructed to report at the shop for work and are not sent on a job, they shall be paid for two hours' time.

On shift work night men shall be paid nine hours' for eight hours' work. This arrangement to apply only when two or more shifts per day are used. Shifts to be changed in rotation weekly. Overtime of night shifts for work over eight hours to be based on regular hourly rate.

3. The holidays shall be all legal and statutory holidays.

4. The help employed shall be divided into two classes: Journeymen and Apprentices.

Apprentices shall be sub-divided into four classes, described as: First, Second, Third and Fourth year, according to time served and qualifications as determined each year upon examination.

Throughout the four years' apprenticeship is to be required, as part of the above qualifications, a successful standing in a supplementary electrical course in the Toronto Technical Schools. This course is to be planned by a Special Educational Committee of three members, one from each organization and one from the staff of the Toronto Technical Schools.

The first half-year of the apprentice's time shall be probationary. At the end of this probationary period, he shall be entitled to membership in Toronto Local 353, I.B.E.W., and to a rate of $8.00 per week.

Second year, 1st half, $9.00 per week; 2nd half, $10.00 per week. Third year, 1st half, $11.00 per week; 2nd half, $12.00 per week. Fourth year, 1st half, 35 cents per hour; 2nd half, 40 cents per hour.

After at least three years' continuous service with the one employer and attaining successful standing at the end of the third year, the fourth-year apprentice shall be loaned by the employer a kit of tools as listed below.

After at least four years' continuous service with the one employer, and being successful in obtaining his Journeyman's card, the employer shall present to the employee the kit of tools which was loaned to him. Lay-off periods shall not be considered as interrupting the continuity of service.

List of tools to be comprised as follows:

.... (fill in) ....

The apprentice, when required, shall go to the shop after 5.00 o'clock to get material so as to be on job with same the following morning at 8.00 a.m., without loss of Journeyman's time. Apprentice shall not be paid for such time.

A fourth-year apprentice shall be permitted to work as a journeyman. Not more than one fourth-year apprentice to every four journeymen in the one shop to be permitted to work under above conditions.

One apprentice to be allowed to each journeyman or fourth-year apprentice.

Apprentices now in the trade are to be classified as soon as possible by the Joint Examining Board as above, upon determination of their length of service and qualifications.

Disabled soldiers, after successful completion of the six months' course in "General Principles of Electricity and Electric Wiring," under the Department of Soldiers' Civil Re-establishment and the Soldiers' Aid Commission, shall be entitled to classification as fourth-year apprentices.

Disabled soldiers with previous electrical experience, who are similarly granted training courses in the industry by the above Commissions shall, at the end of the training period (which shall include supplementary electrical course at the Technical Schools), be examined by the Joint Examining Board and, if successful, shall be entitled to classification as fourth-year apprentices.

Physically fit, honorably-discharged soldiers with previous electrical experience, applying direct for employment, shall be granted same conditions as those in the preceeding paragraph. Minimum wage to be $12.00 per week.

5. The standard rate of journeymen's wages shall be 67½ c. per hour.

Should the Toronto District of the Ontario Association of Electrical Contractors and Dealers receive complaints from two or more members concerning alleged incompetence of a journeyman, or alleging cause for his re-examination and re-classification, or for forfeiture of his membership in Toronto Local 353, I.B.E.W., the matter shall be referred to the Conference Board, with complete information. The Conference Board shall have authority to direct the re-examination of said journeyman by the Examining Board, and the decision of the Examining Board shall be final and binding on all parties. If the Conference Board recommends forfeiture of the journeyman's membership, in Toronto Local 353, I.B.E.W., the recommendation, with full information, shall be passed on to Toronto Local 353, I.B.E.W., for final action.

6. All carfare, other than that to reach the job or shop within city limits and return to employee's residence, shall be paid by the employer, either in cash or car tickets, at his option. All workmen working on jobs beyond the present city limits shall take car going to or returning from work, which arrives at the present city limits as near 8 a.m. or 5 p.m. as car schedule will permit.

7. The Toronto District of the Ontario Association of Electrical Contractors and Dealers shall appoint two members to act with two members of Local 353, I.B.E.W., as a Joint Examining Board.

8. No employer of labor for the installation of electrical work shall be given any better term of conditions regarding hours of labor, wages per hour, etc.

9. Employers, in case of work outside of Toronto, shall pay suburban car, railroad, or boat fare, and all expenses for room and board.

10. There shall be a Conference Board, consisting of three members of Local 353, I.B.E.W., and three members of the Toronto District of the Ontario Association of Electrical Contractors and Dealers. This Conference Board shall meet at least once each month, or at call of their chairman. All complaints by employer or employee, or covering labor conditions, must be submitted to the Board in writing. The Conference Board shall also work out and put into effect rules governing extra compensation to foremen. Rules and Regulations to govern the Board's transactions shall be made by the members thereof.

11. Any journeyman, who shall do any work in violation of the Electrical Inspection Department's Rules, or in such manner so that it will not pass inspection, shall do said work properly in his own time and expense, or pay for same being done. (It being understood that, if such work is done by order of the contractor, the contractor assumes all responsibility as to it being passed by the Electrical Inspection Department, and expense for making work right). In the event of a journeyman refusing to comply with this provision, the matter shall be referred to the Conference Board for investigation and, if the journeyman be found responsible, the Local shall compel him to comply with said provision.

Note.

Mr. Thomas Crawford will be at the Labor Temple each day from 12 to 1 noon. Phone Main 1899 for men.

When hiring men always refer to the last employer.

A Good Motto for 1919

Owing to the unprecedented conditions with which we are at present surrounded, which make it impossible for the wisest to predict what may happen in the next six months, it is more than ever necessary that contractor-dealers, one and all, put their shoulders to the wheels of their organization and push with might and main. A good motto for 1919 may well be—Forget you have a president; forget you have an executive committee; let every member work and act as if the responsibility of the success of the association rested on his own shoulders.

B. C. Contractors Hold a Very Successful Get-Together Supper and Concert—Secretary Capt. Conway has Needless Qualms

A few days ago we wrote Capt. W. J. Conway, secretary of the B. C. Association of Electrical Contractors and Dealers, for a report of their recent get-together supper and concert. Our idea had been to give the usual cut and dried report, but Capt. Conway's reply was so much of an improvement on the usual method of dealing with a function of this kind, so full of "pep" and information of interest to the trade in general, that we crave his pardon for reproducing the letter as it reached us. Evidently the electrical contractors in the coast province are keeping up their enthusiasm in their organization, getting thoroughly acquainted with one another, and improving the status of the contractor-dealer's business. The electrical men in the East wish in a short time to see their way to organize strong associations, so that in the end, we may have the electrical contractor-dealers of Canada working together in one unified, harmonious organization. Capt. Conway's letter follows:

Editor Electrical News:

In reply to yours of the 9th instant, re the "Get-together" Supper and Concert recently held by this association, I regret that a report of the addresses was not taken, but trust that you may be able to obtain a few notes from the following description of the evening we had.

To begin with, the event was, to me, an astonishing success. When arranging for the supper, I was, frankly, scared when the caterer asked me to guarantee at least 75 at the supper. Seventy-five, man alive, where do you expect us to get that number; why there are only about 20 contractors and dealers in the city, half of them are sick of the flu, or are getting over it, whilst the remainder are very busy preparing for the Christmas shopping.

The guarantee was given, and I went about in fear during the interval, though the president of the association, Mr. E. Brettell, assured me that we would have a full house. By the way, the whole of the credit for the success of the affair is due to him; he kindly offered to see to everything himself, knowing that I was very busy on other work for the association.

As the evening approached my fear deepened. I could not see that seventy-five men would turn out on a wet night, and that after a hard day's work. To me, supper at home, slippers and a comfortable seat by the fire, seemed a great rival attraction. Just before the hour fixed for the supper, I was at my worst, my feet were positively cold, though we had to open a few of the windows in the supper room. The sight of those seventy-five empty chairs that went to make up the guarantee gave me something that must be like shell shock.

We had just fixed up everything, where the various speakers were to sit, etc., when the guests began to arrive. Inside of ten minutes we had to arrange for a couple of extra tables—all those gaping chairs were filled, and I was getting anxious as to where we would put the arriving hungry ones. I was astonished and grateful, especially to the electrical men of the B. C. E. Ry. Co., the Western Power Co., the C. G. E., the Westinghouse Co., the Northern Electric Co., etc. The power companies and the wholesalers turned out in full force, as did, of course, our own boys.

As to the evening we had. The supper was fine, and was disposed of in great style, notwithstanding the handicap we labored under, of trying to keep our eyes on our plates and on the pretty waitresses at the same time.

The speeches were all right; just what we wanted; first a talk from Mr. Neill, manager of the Employers' Association, telling us how to play the game, that is, how to be loyal to each other and to our association ethics, etc. He made a great point in advising us to "Stay Together" now that we had got together. This was followed by an excellent address from the credit manager of the Northern Electric, Mr. F. B. Milligan, on accounting; this was full of good advice and pointers on how to keep your books right, and your credit at high mark. Of course he did not forget to give us the advice we all expected from him, that of "be sure to take your discounts." Mr. George Kidd, general manager of the B. C. Electric Railway Co., Ltd., favored us with an all too brief, bright and optimistic estimate of the coming times, with their great after-the-war problems.

The concert part of the meeting was quite up to the high standard set by the speakers. Miss Adair, of the Northern Electric Co., and Messrs. Dingman and Pacey, of the B. C. E. Ry. Co., with Mr. F. Taggart, were in great singing form, and evidently enjoyed their work quite as much as we did, and that was quite a lot. Mr. Brummitt ably assisted at the

Mr. E. Brettell, President B. C. Ass'n. Electrical Contractors & Dealers

Mr. F. B. Milligan, whose address on "Accounting" is printed on the following page

Captain W. J. Conway, Secretary B. C. Ass'n. Electrical Contractors & Dealers piano, going far to ensure the success that was attended in the "Everyone Present" choruses.

This chorus singing was an innovation; type sheets, containing choruses of all the popular songs, were given out with the programmes, and at intervals during the evening, "Everyone Present" was asked to join in singing these choruses. They did join, and lustily, enjoying themselves greatly in the process. The introduction of this chorus singing can be strongly recommended for such gatherings; in these "dry" days, this hearty singing by all goes far to fill the gap.

The singing of the Maple Leaf, and God Save the King, by "Everyone Present," brought the affair to an end, leaving us with the feeling that we were a fine lot of fellows, that we had had a great time together, and that we had got to know each other a bit better at our "Get-Together."

Yours very sincerely,
W. J. Conway, Secretary.

Accurate Accounting Necessary to Success—An Address Delivered by Mr. F. B. Milligan, of the Northern Electric Co., Ltd., Before the Vancouver Citizens' Club on December 12th

The control of one's own business is an absolute necessity in these days of competition. I do not think any man can get out all there is in a business for him, unless he can obtain an accurate financial history of it periodically. When I say all he can get out of it, I do not mean immediate tangible profit, but knowledge and business education necessary to keep abreast of the times, which, of course, means tangible benefit some time. The financing of small and moderate sized business is probably the cause of more real worry in the commercial world than any other phase of business. There appear to be two prime causes for these financial troubles—namely:

1. Lack of sufficient capital.
2. Lack of proper management of such financial resources as are already invested.

Without proper books of account it might be possible to find the trouble, but certainly it would be impossible to prescribe a permanent remedy. I do not wish to suggest that lack of sufficient capital can be remedied by any bookkeeping system. I do say, however, that the results of proper accounting will show you definitely whether or not it is possible to go on without additional funds. If it is hopeless the figures should tell you so, and far better know it at once than later. As you know, lack of capital results in weak purchasing power, loss of credit and loss of discounts. Any one of these is sufficient to cause serious trouble and all three together generally mean ruin.

A complete accounting system has been published with the approval of the National Association of Electrical Contractors and Dealers. This not only advises you how to instal the system, but gives cuts of charts and standard forms. It also goes into detail explaining the use of each form and why it is necessary, and especially dwells on overhead accounts, giving eighteen general headings and showing in detail just what each heading covers. It further explains the closing of the books each month, and how to make up the Trial Balance, and how to close the books for the year. This system has been made after considering and adopting the following six cardinal principles:

1. All forms should be standardized.
2. All sales, whether contract, jobbing, day work, or retail, should be costed.
3. A merchandise account should be created through debit entries for purchases and credit entries at cost for materials sold in any way.
4. A general ledger containing all controlling accounts should be made a part of the system.
5. All liabilities should be vouchered each month irrespective of receipt of goods or corrections of invoice. Provision should be made for recharging vendors for any errors or discrepancies in bills.
6. Cash book should combine bank records, both receipts and payments, that is, debit entries equalizing bank deposits for the month and credit entries equalizing charges to bank balance. The cash book should not be used for distribution.

Theoretically, business men correct their overhead percentage at the end of the fiscal year. In practice very few actually do it. Even when the overhead percentage obtained will be an accurate measure of the overhead that should be charged into sales during the next year. It may be an accurate measure and it may not. It may protect the business at the beginning of the year, but it may cease to do this and become a source of danger to profits, if later there is a heavy increase in costs which is not offset by an equal increase in selling prices. I would advise that you see that it is done at once as it is most essential. Granted that the overhead percentage for 1917 was correct, which you should have used for 1918, do you think it advisable to use this percentage for 1919? Certainly not. You should analyze your business at the end of this year, so that you can determine exactly what your overhead should be for 1919.

Nobody knows what the absolute overhead percentage is in electrical business for the country as a whole. That cannot be known until a uniform accounting system has been established on a national scale and has supplied cost figures covering a long period. At present an overhead percentage taken out of any one of several concerns and applied to a group of dealers or contractors can be only an approximate percentage. Yet for all practical purposes it may be a safe percentage for that group. And it would be a dangerous percentage when applied to remote sections of the country, without allowing for the cost variations for that section. It also becomes a dangerous percentage when it is applied over a period of years without annual verification or correction, or when it is applied to a business without an actual test.

Below, I give, in detail, the cost of doing business during 1917 of a Northwest Contractor and Dealer. His cost percentage (based on total sales) covers both contracting and retailing:

		Per cent.
Salaries and wages	$3,922.10	14.4
Rent and heat	480.19	1.8
Light and power	209.03	.8
Upkeep and repairs		.0
Depreciation	111.24	.4
Insurance	137.51	.5
Taxes	107.20	.4
Interest	391.30	1.5
Telephone, telegraph and postage	188.91	.7
Printing and stationery	129.10	.5
Advertising	321.52	1.2
Supplies	131.39	.5
Hauling and delivery	662.59	2.5
Travelling expenses	156.35	.6
Bad debts	272.62	1.0
Association membership	89.25	.3
Gratuities	17.00	.6
Miscellaneous		.0
Total costs	$7,327.30	27.7

Total sales, $26,785.01.

This appears on the face to be considerably higher than the overhead of an average business, but as it is taken from actual conditions, it would appear that he is justified in using this figure. However, as I stated before, you should be sure that the figure you intend to use for 1919 is accurate, as you will have to take into consideration that we will shortly have peace, and consequently, a reconstruction period which may change this considerably.

Overhead Costs on Jobs Varying from $200 to $200,000 Varies Between 52 and 8 per cent.—What is Yours?

In our last issue we printed a brief reference to the work of the Electrical Estimators' Association, of Chicago, in connection with the preparation of figure showing the cost of overhead on jobs of various sizes. The results of the investigations of this association were recently presented by Mr. E. L. Morley, of the L. K. Comstock Co., at a conference of estimators and contractors in Chicago. We print below extracts from this report, and also a curve showing the overload percentages on jobs varying from $1,000 to $15,000, taken from Electrical Merchandising. In this curve the overhead is expressed as a percentage of the cost of installation and not of the volume of sales. The extension of the curve beyond $15,000 gives the following percentages: $20,000, 13 per cent.; $30,000, 11.5 per cent.; $40,000, 10.75 per cent.; $50,000, 10.5 per cent.; $60,000, 10 per cent.; $100,000, 9 per cent.; $160,000 and up, 8.5 per cent. In the curve, a $200 job runs 52 per cent.; a $300 job, 42 per cent.; a $1,000 36 per cent.; and so on. The extracts follow:

The first question to present itself to your committee was: What is "overhead"? Several descriptions were given. One described it as the ratio of the annual cost of doing business to the total volume of sales; another, the ratio of the annual cost of doing business to the volume of sales less the profit; and still another, the ratio of the annual cost of doing business to the cost of labor and material installed during the year.

Working with any of these descriptions gives only average percentage and therefore not the correct percentage of overhead to be added to the estimated cost of any particular installation, and that's the thing we're after.

In all discussions of overhead, either written or oral, with which I am familiar, the statement is made that overhead determined in accordance with one of the foregoing descriptions for any year cannot always be safely applied for the next year, as the volume of business may change and other conditions vary. This is at once an admission that the overhead percentage so determined is of little value.

You also hear it stated that the overhead of contractors doing a large volume of business is less than that of a small contractor. This is true, but not the whole truth. Any large contractor who thinks his overhead on a small job is less than the small contractor's is fooling himself The real reason for the large volume of business being carried on with a lower overhead is due to other causes than the volume. I will endeavor to make this clear later.

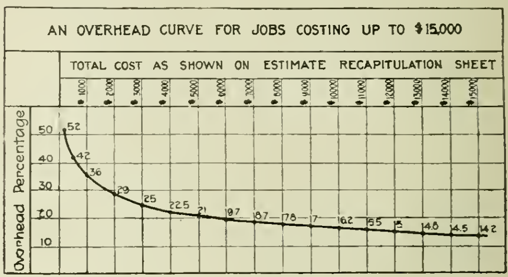
The committee finally decided to accept the cost of installation as the base for expressing overhead.

Decided What the Curve Should Represent.

A suggestion had been adopted that a curve of overhead percentages be plotted and it became necessary to decide what this curve should represent. The original suggestion was to plot percentages in relation to the annual volume of business. This was at variance with the decision to use cost of installation as the base for expressing overhead. The point was also raised that a curve using installation cost would give only average results and therefore would not give the proper percentage to be applied to any particular estimate as installations of different costs carried entirely different percentages of overhead. This immediately started something and actual experiences were given showing that this point was well taken.

An example is as follows: The John Jones Company calls up for an estimate on alterations and additions to wiring in its building. An estimator is sent and requires an hour or more to reach the location, waits fifteen minutes or so to see the proper party, spends an hour going over work, returns to office, makes up installation cost as approximately $1,000. Estimator's time one day. What overhead should be added—the average? A contractor doing so and closing the contract will be losing money on that particular job unless the average estimated cost of installation of his jobs is $1,000 or less.

How many $500 and $1,000 jobs does a contractor figure on and how many of these does he close? A ratio of 10 per cent. is probably high. The overhead for any particular cost estimate must include as nearly as possible the expense of estimating similar work which was not closed.



Curve showing overhead for jobs $200 to $15,000

Let us follow this job after it is closed by a contractor who has added 20 per cent. to his labor and material cost for overhead and 15 per cent. to this net cost for profit; result, $1,380, a total of 38 per cent. above estimated cost. The contractor has been fortunate, only estimating nine other similar jobs not closed. Each has had an estimating cost averaging not less than $10, probably more. Fifty per cent. of the overhead is gone and the job only closed. Overhead has bee working unobserved . It now gets busy in the open. Its first demand is a job ticket and this costs at least as much for a $1,400 job as for a $10,000 one, and probably more as there are no plans and specifications and the ticket must give an accurate description of the work. The mechanic is then made familiar with the work by either coming to the office or meeting the estimator or superintendent at the job.

The material list is made up and orders sent out. The time and material cost for these items is much greater in proportion for the $1,400 job than for the $10,000 one And so on along the line for superinterding, bookkeeping, and all other items entering into overhead expense. When the work is completed, the overhead has been nearer 40 per cent. than 20 per cent. and all or part of the expected profit goes to overhead. The contractor does not know this as he has not separated his overhead for this particular job. At the end of the year, however, he realizes that his profits are not as great as he expected from what he considered liberal percentages added for overhead and profit on his smaller work.

After several stories similar to the foregoing and many discussions, a curve was developed by using a few points obtained from actual data given by members of the committee. From this curve I will endeavor to explain why these results are more nearly correct than the average percentages usually obtained.

The curve is drawn in two parts. The more important part is drawn with the large divisions representing $1,000, while in the other portion they show as $10,000.

Always bear in mind that the dollars cost shown represent the estimate sheet cost and that the overhead percentage is applied directly to this cost.

By estimate sheet cost, or installation cost, is not meant simply the estimated cost of labor and material, but also includes all items directly chargeable to the job, such as bond, if any, liability insurance, drawings, inspection, freight, railroad fares, board, etc.

The curve starts at $200 with 52 per cent., falls rapidly to 42 per cent. at $500, 36 per cent. at $1,000, 29 per cent. at $2,00. 25 per cent. at $3,000 and is now falling more gradually to 21 per cent. at $5,000, 16.2 per cent. at $10,000, and 14.25 per cent. at $15,000. In the other curve we find a still more gradual decline to 13 per cent. at $20,000, 10 per cent. at $60,000, 9 per cent. at $100,000, finally reaching 8.5 per cent. at $160,000, and thereafter the curve is practically horizontal at 8.5 per cent.

The small contractor doing an annual business of $20,000 to $40,000 will find his job costs falling on the curve from $200 to $5,000, with the larger proportion near $1,000 or less. From $50,000 to $100,000 the job costs will fall around $2,000 to $5,000. The large contractor doing $250,000 to $500,000 will find his jobs on the flatter portion of the curve from $10,000 up.

From this it appears that the lower overhead of the larger contractor is due not to the fact that the volume of business is greater, but to the lower percentage of overhead which the larger contracts carry.

Irrespective of the yearly volume of business, each estimated job should be apportioned its proper overhead percentage, as determined by its size, instead of an average percentage obtained from the annual cost of conducting the business and the volume of business.

In using a curve of this character it is easy to check at the end of the year whether the overhead percentages are correct or not, by tabulating the cost of all jobs and applying to each the proper percentage of overhead according to its size. The total should approximate the amount the books show as the cost of running the business.

Let us now turn to the application of the curve where the volume of business increases or decreases. If the volume decreases materially it is usually due to fewer of the large jobs and a portion of this may even be offset by more small ones. As the small jobs carry the larger overhead, it is readily seen that the overhead tends automatically to adjust itself where an average percentage would not. This also applies to an increase in volume. The increase being usually due to more of the larger jobs.

With this system of applying overhead it is evident that the large contractor bidding on the small work in competition with the small contractors should use practically the same percentages and in so doing, if he obtains the work, not rob the larger jobs of profit to pay overhead on the small ones.

This system, we believe, will put estimating on a firmer foundation, stabilize quotations and improve the condition of the electrical contractors in general, which is the aim of all associations connected with the electrical industry.

Canadian General Electric Company Open Handsome New Supply Warehouse

The Canadian General Electric Co. have recently completed and opened their new supply warehouse on King Street West, just adjoining the head office building, at the corner of King and Simcoe Streets. This building is of mill construction, six storeys and basement, measuring 48 ft. x 185 ft. The main entrance is on King Street through a spacious vestibule, flanked by large show windows, illustrated in one of the cuts herewith. Immediately inside is the main department. The front portions of the second and

View of entrance to C.G.E. supply warehouse—Large display window on each side

View of section of general sales room

View of section of general sales room

third floors are occupied as offices; the rear portions of the ground, first and second floors, for packing, shipping and storage purposes. The three upper flats are being used exclusively for storage. A view of one of the upper floors is shown in one of the illustrations, which indicates, in a general way, the plan of the three upper storeys, that is, on the right hand, tiers of storage shelves, and on the left hand, reserve stock ready to place on the shelves as the supply needs replenishing. Each floor is divided into sections, generally four, each in charge of one man, and when information is required as to whether any particular line is in stock, the particular man in charge of this section is immediately communicated with. This avoids the possibility of accepting an order for goods not in stock and also guarantees prompt shipment.

View of stock room, showing compact arrangement

The building is equipped with a steel spiral goods chute, operating from each floor to the ground floor, on which goods are placed as soon as they are prepared for shipment. There is also an automatic dumb waiter and an electric freight elevator, in addition to the passenger elevator.

Two of the views show the main sales and demonstration room on the ground floor. The company do not encourage retail sales, preferring rather to maintain this room for the use of contractor-dealers and jobbers, and for pure demonstration purposes.

A feature of the new building is the arrangement and organization which will make it possible to give an exceedingly prompt service. For example, a contractor-dealer approaches the counter and asks for a certain article. The request is promptly telephoned to the individual section where this article is stocked. The article is placed on the dumb waiter and delivered to the ground floor, where an attendant, always in waiting, places it upon the counter. Orders received by mail or telephone receive the same treatment. It is the ambition of the management to give a service comparable with that of the best retail department stores, and under the efficient supervision of Mr. L. O. Horner, who is in charge of the supply sales department, there is every evidence that this ambition will become a fact.

The basement is given over to the storage of heavier material, such as piping, large coils of wire, etc.

The Harvey Hubbell Co. of Canada, Limited, Mr. E. G. Mack, Managing Director, have just issued a new catalogue, No. 16. The complete line of Hubbell products is now manufactured in Canada, and Hubbell products may be obtained from coast to coast through any reputable supply house, or direct from the company. A copy of the catalogue may be had on request to the company at Toronto.

The Canadian Crocker-Wheeler Company, Limited, St. Catharines, Ont., have issued Bulletin No. 1000, illustrating oil switches, induction motors and transformers.

The Canada Wire & Cable Co., Limited, Toronto, will exhibit at the Lyons, France, fair, to be held in March next.

Northern Electric Company Placing on Market a Large Range of Farmers' Light and Power Plants

Feeding the world is a big job but this is really the job that the Canadian and the U. S. farmer now have before them. It is big business and profitable business, but if the farmer to-day is a business man, and farming is his business, then surely he must use business methods and employ the most efficient means available.

Electricity spells efficiency for the farmer just as surely as it does to the manufacturer or other producer in the city. When the many electric power lines first began extending into the rural districts most farmers thought that they would soon be able to have the current on their own farms, but when we realize the tremendous number of farmers and their distribution over such an enormous territory, it becomes evident that the majority of farmers must always depend upon a private electric service.

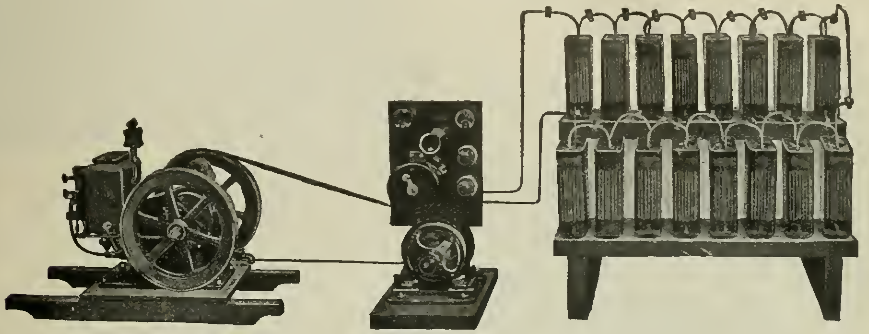


Fig. 1—Belted type can be used with farmer's own engine—Storage battery mounted on stand.

This situation is practically the same as the telephone business; the larger companies have been able to develop the important centers, but for the neighborhood lines thousands of local companies have been formed.

A new power and light generator for the farmer is now being placed on the market by the Northern Electric Company. The company offers two types of equipment, first, that for use with the farmer's own engine, commonly known as belted type, and the Consolidated or direct connected types, which combine in a single unit the electric generator, switchboard and engine. Both of these systems use storage battery for all light load service. The belted type has the particular advantage for the farmer in that he can use a gasoline engine for running the milking machine or pumping water for the stock, and at the same time operate the dynamo to produce electricity which can be used for charging the storage batteries, then in the evening or other time when the engine is not running the electricity is available. Figure 1 shows this belted equipment with the storage batteries mounted on a very convenient stand.

Many farmers and others have no power requirements and prefer an equipment which will require a minimum of attention and occupy a small floor space. The Consolidated type equipment of the company is furnished both in the semi-automatic and full automatic types. The semi-automatic type starts whenever a button on the plant is pressed, but stops automatically when the batteries become charged. So long as these private plants were largely used for lighting this arrangement was all that could be desired, but during the past few years the exceptional demand for power has made it necessary that the plant should also start automatically. Figure 3 shows a one kw. full automatic plant which has the following features: the plant will start automatically whenever the storage batteries are 15 per cent. discharged, thus leaving always in reserve 85 per cent. of the storage battery; will start automatically at any time whenever a power device is connected to the circuit or whenever load exceeds 350 watts; will stop automatically when the batteries are filled. This machine takes full advantage of the storage battery for all ordinary loads, but does not demand that the storage battery be used for power work. Such an arrangement gives a machine the highest efficiency possible. For all power work the greatest efficiency is obtained by not having to pass the energy through the cycle of charge and discharge of the storage battery. Another desirable feature of this equipment is the fuel system. It employs the well known Stewart-Warner Vacuum System and utilizes a tank separate from the plant. The user can provide a tank of 50 gallons or even more outside of the building and bury it in the ground. Such an arrangement is highly favored by the Underwriters, as it is not gravity feed and for the user means greatest convenience. Such a large fuel supply combined with an automatic plant enables the user to get electric service for power or light without having to be continually filling the tank or worrying whether his storage batteries are charged or not.

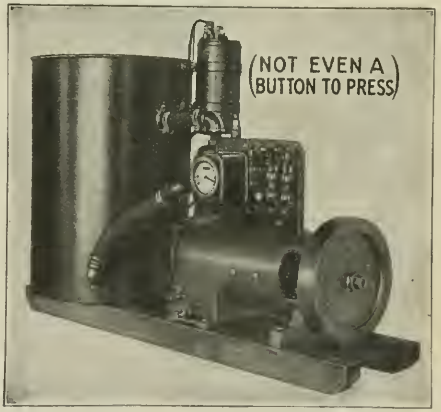


Fig. 2—Automatic 1 3 kw. "home" size

An automatic plant of 1-3 k.w. is also furnished, see Fig. 2, and while this will pump 120 gallons of water an hour, or run the washing machine, churn or cream separator, it is not intended for heavy duty power equipment. It is a home size, automatic, storage battery plant, and is an ideal equipment for use in summer homes, town residences and all of the places where 15 to 20 twenty-watt lamps will provide sufficient lighting.

The company also supplies regularly 2, 5, 10 and 15 kw. plants full automatic. The 5 kw. is particularly adaptable for small town lighting. As the operation is automatic the owner can afford to have an installation and sell current on the measured basis, whereas with the manual system which requires his constant attention there would not be sufficient earnings made to warrant the time he would have to spend.

The 2 kw., as regularly furnished, is 32 volt or 110 volt. All plants under 2 kw. are 32 volts and all over are 110 volts.

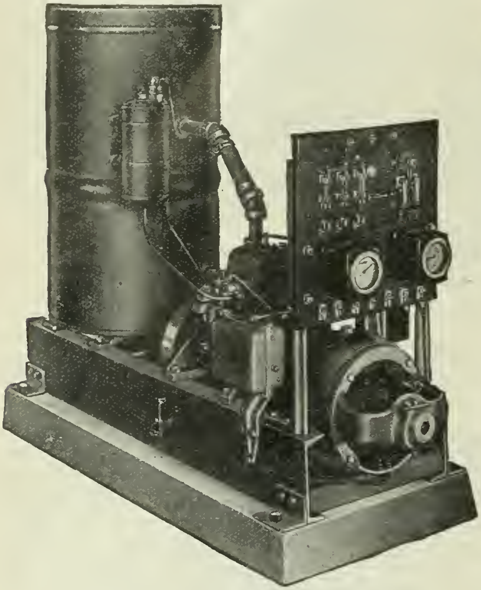


Fig. 3—1 kw. full automatic plant

This range of plants, from 1-3 to 15 k.w., is the most complete upon the market and offers the electrical contractor a most valuable addition to his lines. He will have a plant for every prospect, and once he has started the sale he will not be obliged to give up the job on account of having too small a plant, or actually take the job and then furnish a plant entirely inadequate for their requirements.

We understand it is the company's intention to sell this equipment through the electrical trade as far as possible. Electrical dealers should be quick to see the advantage of doubling their prospects. Census reports show that half of the population of the country live on the farm. This practically undeveloped trade should go to the electrical dealer. He is the logical man to sell such lines and as his business as an electrical dealer is now established, and he can handle the installation better than anyone else, he should get this business.

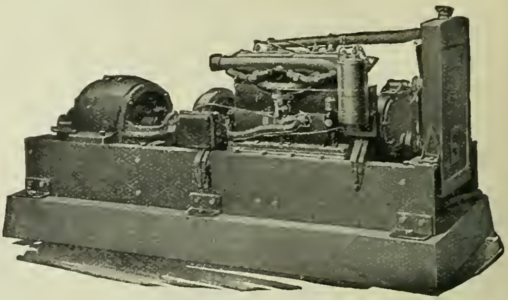


Fig. 4—5 kw. automatic equipment

Air Compressors; Steam Stop Valves, Check Valves, Water valves and Accessories.—Two very complete catalogues, issued by Alley & MacLennan, engineers, Glasgow. These catalogues are well illuustrated, bound with stiff covers, and contain a quantity of useful information on the subjects of which they treat.

WANTED

A real live Electrical Contractor-Dealer in each of the Provinces of Alberta, Saskatchewan and Manitoba, to get in touch with the B. C. Association of Electrical Contractors and Dealers with a view to forming kindred associations in these provinces. Address the Secretary, 406 Yorkshire Building, Vancouver, B.C.

A by-law authorizing the purchase of the electric lighting plant owned and operated by Mr. Walter Gould, Uxbridge, Ont., has been passed.

WRITE TODAY

for full details of our interesting proposition.

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Indestructible—Foolproof—No Water—No Repairs

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Built to Specifications of Hydro-Electric Power Commission of Ontario

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Current News and Notes

Antigonish, N.S.

The municipal electric light plant at Antigonish, N.S., was recently destroyed by fire. It will be rebuilt immediately and it is likely that two new generators will be required.

Bloomfield, Ont.

Arrangements have been made for the construction of a distributing system at Bloomfield, Ont. The citizens agreed to dig all the holes necessary, free of cost, and the Hydro-electric Commission will complete the rest of the work, employing local labor.

Brantford, Ont.

A by-law authorizing the expenditure of $125,000 for extensions to the Brantford street railway, was passed by the ratepayers on January 1.

Carleton Place, Ont.

The ratepayers voted on January 1 on a Hydro enabling by-law to provide for the purchase of the local plant owned by H. Brown & Sons for the sum of $100,000.

Cobalt, Ont.

M. J. O'Brien, of Renfrew, Ont., is said to be interested in a water-power development at Des Quinze, about twenty-five miles northeast of Cobalt. This site is centrally situated in a good mineral and pulpwood zone and is said to be capable of yielding 250,000 horse-power.

Hamilton, Ont.

It has been suggested that the Hydro-electric Power Commission take over the Hamilton Radial Railway line running from Hamilton to Oakville and operate it as a link in the proposed system of Hydro railways. The company suspended operations beyond Burlington Beach on December 13 owing to the refusal of the municipalities interested to grant an increase in fares.

London, Ont.

The fare on the London and Port Stanley Railway, between London and Port Stanley, has been increased from thirty cents to fifty cents return, effective from the 24th of May to the 10th of September. Children will be carried for half fare.

Niagara Falls, Ont.

The ratepayers of Niagara Falls, Ont., have passed a by-law authorizig the purchase of the local street railway, which is operated by a private company. The franchise expires in March, 1920.

Regina, Sask.

At the coming session of the Saskatchewan legislature an amendment to the Railway Act, permitting the use of one-man cars, will come up for discussion.

While the number of passengers carried by the Regina municipal street railway during the year 1918 was 200,000 less than in 1917, the revenue was $15,500 over that of the previous year. This was due to an increase to the straight five-cent fare early in the year. The total passenger receipts amounted to $230,582.

Vancouver, B.C.

The Vancouver city council have drawn up an agreement providing that the pay of electrical workers, from January 1 to December 31, 1919, shall be as follows: Foremen, $175; linemen, $150; operators, $135.

Commencing on January 1 the British Columbia Electric Railway Company put into effect a 25 per cent. reduction in domestic lighting rates. The charge is now 6 cents per kw.h.

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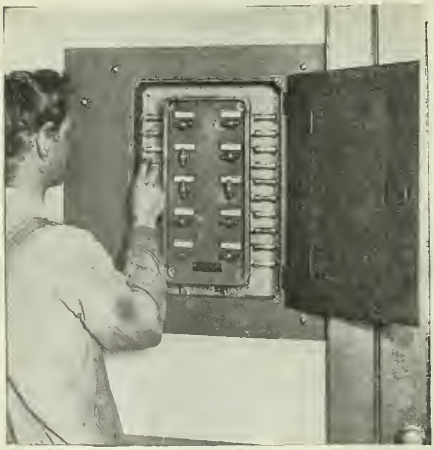
and Operate the Switches of a

Krantz Safety Panel Board



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For full particulars apply to the Town Clerk,

Town of Lloydminster,
Saskatchewan.
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State qualifications and salary, with references.

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Electrical Salesman Wanted for Canada

Engineering Graduate preferred, to represent well-known manufacture of Transformers. Apply Box 833, Electrical News, Toronto, Ontario. 2

Can We Sell Electrical Goods in France?

Electricity as a great labor-saving source, will have much to do with the reconstruction of France and Belgium, and it would seem that American manufacturers will be called upon for many electrical devices. An engineer who has made a close study of the French market for 25 years, believes that material if not radical, changes in their products must be made by American exporters who expect to dispose of their goods in France, where the methods of instalation and the standards of quality are old-fashioned, to say the least.

"American methods and materials make the cost per outlet prohibitively high," said a French importer, "and that is the principal obstacle to the sale of American electrical supplies. Because carelessness is not a national trait with us, the fire losses due to electrical installations in France are not one-tenth as great as the losses from similar causes in the United States, in spite of our crude devices, so we naturally think that such devices are good enough. If Americans will make simpler and less perfect appliances which will be cheaper to produce, thereby lowering the selling price, the French market offers good prospects. The cost is the chief factor."—Scientific American.

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1	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	2	60	220	720	Fbks.-M.
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	20	3	25	550	710	Westg.
1	15	3	25	550	1500	C. G. E.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	Westg.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
3	5	3	25	550	1440	Excelsior
1	5	3	25	550	720	Westg.
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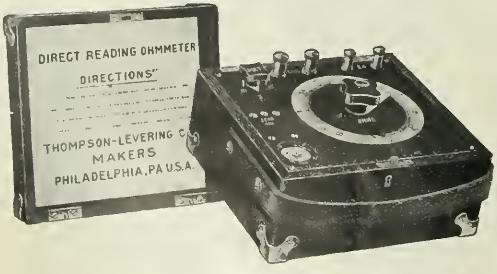

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Generation, Transmission and Application of Electricity

Published Semi-Monthly By

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A Practical Illustration of Domestic Electric Heating

In this issue we print an interesting description of an electrical house-heating system which, in the completeness of the records, leaves little to be criticised. Naturally it corrobates to a high degree the figures that have been so often worked out theoretically and the chief interest attaching to this installation perhaps is the fact that the coincidence is so well marked. Certain as we may be of our mathematical conclusions it is always satisfactory to have an ocular verification of them and this is exactly what the plant described has done—proven that electric heating is feasible, that it costs just so much and that in point of convenience and luxury it is as good in practice as in theory.

Quite a good deal has recently been made of the argument that if the whole of the supply at Niagara Falls could be available there is not nearly enough to heat the buildings in south-western Ontario or, indeed in Toronto alone. No doubt this is quite true, but it also is doubtless true that it will be a long time before all of this district asks for electric heating. By that time we may have solved our own lignite supply problem or Dr. Steinmetz may have started manufacturing electric energy by utilizing the sun's energy. In view of the threatened difficulties in our hard coal supply the wisest course would seem to be to develop all our water power with the greatest possible speed so that we may have them ready when we want them—not five years after we are all frozen up and our industries put out of commission.

There is quite a good deal to be said, too, in favor of an electric heating load which would be used in summer for some industrial purpose, say the fixation of nitrogen for fertilization, or other purposes. Also it is also reasonable to suppose that some improvement can be made in the house heating system described, so that power could be released for individual purpose during the day and stored for heating purposes during the night. The installation under consideration had a water tank two feet in diameter and two feet deep. Why not a tank ten feet in diameter and seven feet deep, if necessary, occupying the space now required by the furnace and the coal bin. The results of this experimental installation show that with power at about .4 cents the cost of electric heating will compete with the coal heated furnace, with coal at present prices. If the load factor could be arranged, this figure would be acceptable to many a central station.

An Important Water Power Conference of Dominion and Provincial Interests

A most important conference of Dominion and Provincial Engineers was held in Ottawa, on January 16th and 17th, under the auspices of the Dominion Power Board, of which the Hon. Mr. Meighen, Minister of the Interior, is chairman. Mr. A. St. Laurent, the vice-chairman of the Board, who presided, stated that the recent crisis regarding both fuel and power had brought the tremendous importance of both very prominently to the front, and shown with greater force than ever the necessity of developing and conserving our water powers to the utmost. The first step to this end, seeing that various authorities are handling the problem in different parts of Canada, is to, as far as possible, arrange their methods and organizations along similar lines, viz., the standardization of field and office methods and equipment, uniformity of publications, both in matter and arrangement, period to be covered by each, etc., etc.

The administrative end also had to be considered, with a view to making the requirements and regulations of all the authorities concerned, whether Federal or Provincial, as uniform as possible.

There were present at the Conference, Messrs. H. G. Acres, chief hydraulic engineer, Hydro Power Commission, Ontario; Arthur Amos, chief engineer, Hydraulic Service, Quebec; R. J. Burley, Reclamation Service, Ottawa; E. F. Drake, Reclamation Service, Ottawa; C. O. Foss, chairman, N. B. Water Power Commission; T. W. Gibson, Deputy Minister, Crown Lands, Ontario; H. W. Grunsky, legal adviser, Dominion Water Power Branch; J. T. Johnston, assistant chief engineer, Water Power Branch; E. B. Jost, engineer, Department of Railways and Canals; R. S. Kelsch, consulting engineer, Montreal; O. Lefebvre, chief engineer, Quebec Streams Commission; K. H. Smith, engineer, Nova Scotia Water Power Commission; R. G. Swan, chief engineer, British Columbia Hydrometric Survey; Wm. Young, Comptroller of Water Rights, British Columbia; together with the following Ottawa members of the Power Board: A. St. Laurent, vice-chairman; W. A. Bowden, D. B. Dowling, B. F. Haanel, C. N. Monsarrat, John Murphy, J. B. Challies.

As a basis for a uniform system of locating any and all water resources, and analysing and filing all data of whatever kind concerning them, which is the first requisite to coordinated working, there was laid before the meeting a Water Resources Index-Inventory, designed by the Dominion Water Power Branch, and which the Dominion Power Board submitted as one which would suit the needs of any and all authorities concerned with water investigation, whether Federal or Provincial. The basis of the system is the dividing of the country into its main or basic water sheds, eleven in number, with sub-basin and other divisions. Combined with this are detail maps, a card index system, and a folder equipment, the whole forming an indexing and filing system adaptable to the needs of all the various organizations concerned with any type of water investigation or administration.

Following a lengthy discussion as to how various local conditions would be covered it was shown that the system was of such flexible and comprehensive nature as to be adaptable to practically any needs that were likely to arise. In view of this, and of statements by several of those present that they already had the system in use in their offices, in whole or in part, a resolution was passed by the Conference recommending the adoption of the system by all Federal and Provincial authorities concerned, and further, to facilitate its adoption, that an explanatory monograph on it, accompanied by maps, diagrams, etc., be published for general distribution.

Meteorological data, as a fundamental branch of water survey, was discussed at some length, it being pointed out that continuous and complete meteorological figures were often of inestimable value in deciding as to the water likely to be available for either domestic, irrigation, or power purposes. In view of this, a resolution was passed aiming towards extending the work of the service.

The next matter considered was the co-ordination of the work of investigating water resources, it being pointed out that in view of the fact that several Federal and Provincial organizations were at work on the same matter, in different sections of Canada, it would greatly help if their field and office procedure and their equipment, and finally their publications, could all be largely standardized, both as to form and contents. A resolution was passed recommending the yearly publication of hydrometric data, each report to cover a climatic year extending from October 1st to September 30th; and to include daily discharge records, but daily gauge heights only in those special cases where they are obviously necessary. The Power Board is to prepare and distribute a key map showing the territories covered by the different organizations and surveys. Other details were thought to be so many and so complex as to require extended consideration, and it was decided to leave them for definite decision at later conferences, one in the West and one in the East, after which another and plenary conference at Ottawa would make final recommendations on the whole subject.

The final matter before the meeting was that of Water-Power Regulations, the question being introduced in the form of a report prepared by Mr. H. W. Grunsky. As the subject is an exceedingly large one, and the report most comprehensive, it was felt that it was impossible to do anything but discuss the main divisions, six in number, viz.: Nature of Franchise, Control of Stock and Bond Issues, Rentals, Renewed Provisions, Extent of Properties taken over if license terminated, and Compensation therefor, in a preliminary way, leaving any decision thereon to a future meeting. Practically all those present took part in the discussion, which covered such points as Sale or Rental, Limited vs. Indefinite Franchises, Nominal or Substantial Rentals, Uniform Canadian Regulations, etc., etc., after which the meeting adjourned, first deciding that after the organizations more particularly concerned had gone further into the matter, the Dominion Power Board should call another Conference on the subject.

Government officials at Washington have made public some details in connection with the wartime development of under-water wireless. In practical use the new system is, up to the present time, employed only for receiving and it is said that radio messages sent out from powerful stations in Europe are now being read at underground receiving stations in the United States—in some cases better than when caught by the air stations. It is said to be the development of James H. Rogers, a scientist of Hyattsville, Md.

Commissioner Harris at Toronto Section A.I.E.E.

It was a very interested assembly which listened to the lecture by Works Commissioner R. C. Harris, at the Engineers' Club, on Friday, January 17, on the occasion of the Toronto Section A. I. E. E. semi-monthly meeting. The subject of the lecture was the Bloor Street Viaduct and this was, we think, the first time since the viaduct has been opened that it has formed the subject of an authoritative address. Mr. Harris in his usual attractive style gave a historical sketch of the development of the city of Toronto east of the Don River and showed how for a long time the means of access across the valley had not kept pace with the growth of this district. This territory was first approached by a low level bridge crossing the Don at Queen Street which also intersected the main lines of the C. P. R. and the Grand Trunk Railway on the level. In these days the only transportation east of the river was afforded by a gravel train which, hauled by a wood burning locomotive traversed the two and a half miles from the Don bridge to Ben Lamond, (now St. John's cemetery) and occasionally hauled a double decked passenger car. The situation was improved when the high level bridge was erected at Queen Street; also by the construction of the viaducts at Gerrard Street and Wilton Avenue. At the same time the population had increased so as to demand still greater facility of access, for in 1918 the inhabitants of the city east of the Don amounted to more than those in all the city of Hamilton.

The first proposal for a bridge on the site of the present structure was made about twenty years ago and was based on the crossing being made at a low level there being a down grade approaching the bridge on each side. Several alternative proposals were subsequently submitted, but for many years it was impossible to secure the vote of the people in favor of the scheme. During the regime of Mr. C. H. Rust, as city engineer, a more ambitious plan was introduced by which the alignment would be constant throughout from Bloor Street to Danforth Avenue; this would have necessitated considerable structural work to bridge the Rosedale Ravine at a very small angle and all things considered it was thought better to adopt the plan which has now been followed. In this the roadway swings south from Bloor Street and skirts the southern side of the ravine turning north so as to cross it at the head of Parliament Street. It then swings east in direct alignment with Danforth Avenue and crosses the Don on five magnificent spans. The width is maintained at 86 feet throughout.

The foundation proved a matter of some difficulty as it was found that the rock shelved away very rapidly on approaching the river bed and it was necessary to go down forty-six feet to reach bedrock. The matter of steel versus concrete was very thoroughly debated and an engineer from the Works Department visited a number of installations in the United States to gather information on this point. It was found that the best and most conservative opinion was in favor of steel for a structure of this size in the latitude of Toronto, and the decision was made to employ steel for the Bloor Street Viaduct.

Mr Harris showed quite a number of slides depicting different aspects of the work and the photograph of the engineers concerned was received with enthusiasm. In moving a vote of thanks to Mr. Harris, Mr. Maclachlan commended the idea of having frequent addresses on matters of local engineering interest. There were right here in Toronto works of a magnitude unsurpassed anywhere in America and as a rule the citizens were most ignorant of them.

Heating Our Homes with Electricity

A Pioneer Installation in Toronto Which Proves that Electric Heating is Entirely Practical—Cost Not Prohibitive for the Well-to-do Citizen

In the popular mind there has been a growing feeling for many years that the general use of electricity for house heating would be an eventuality of the near future. Newspapers have explained away all the difficulties and aspirants for municipal honors have included it in their programme of promised immediate reforms. Only the stupidity of the engineer, who has failed to understand the situation and grasp the opportunities within his reach, has retarded this modern development.

However, when seriously considered, there are two obstacles which, though not insurmountable, (because no obstacle is insurmountable, according to Captain Carpenter of Zeebrugge fame), nevertheless are rendering the solution of the electric heating problem difficult. First, the coal is high, and second, the supply is not unlimited. Apparently there is not enough energy in all our water powers to supply the whole country with heat and there would be comparatively little to gain by transforming coal into electric energy for heating. The fact that we have twenty-five million horse power, and more, running to waste in our water powers in Canada, however, is something of an encouragement, and justifies us at least in considering what we might do if we had a larger and all-sufficient supply. On the supposition that we have ample power for the purpose of electric house heating it really seems open to argument that we are approaching a time when the cost might be made sufficiently attractive to a percentage at least of our population. When coal was selling at $6 and $7 a ton it was argued that electricity must be obtainable at one-fifth cent per kw.h. However, the last two or three years have changed the whole situation. In Toronto coal is selling at $12, and a certain uncertainty always must attend the supply. In towns in the immediate neighborhood of Toronto, $14 and $15 is being paid, which means that electric heating would be feasible at a cost of about .4 cents per kw.h. Now this is not an unheard of power rate with a good load factor, and the only other difficulty here seems to be that the heating load is a seasonal one. It is all right while it lasts—for six months of the year—but for the other six months it would be necessary to establish industries to take care of the same amount of electric energy as is required during the coldest winter months.

Electric heating is being used already very largely for auxiliary purposes. There are a large number of homes in our cities and towns where one or two little heating devices are requisitioned to supplement the coal furnace on extra cold days or in the late fall and early spring, and the fact that this practice is becoming ever more general and is giving a wonderful amount of comfort and satisfaction, indicates that people, after once using electric heating, soon come to appreciate that there are other things to be considered about it than mere dollars and cents. There are not many cases on record, though, of whole houses being heated electrically and where such experiments have been tried, the data has been more or less intermittent and lacking in accurate detail. Such as have been obtainable we have reproduced from time to time in the Electrical News and so far as comparisons could be made these results have always appeared to bear out in fair degree the figures advanced by theory. However, we are now in a position to describe an installation of household heating by electricity with an accuracy of detail which, we believe, has never before been possible. This installation is in the home of Mr. J. B. Kitchen, 23 Tyndall Avenue, Toronto. Mr. Kitchen had the installation put in under his own supervision and has personally watched its operation and collected and compiled the data.

The system was installed in the winter of 1916 and during that season the preliminaries were all arranged and the installation completed in detail so that everything was in working order by October 1, 1917—the beginning of last winter's heating season. From October 1 to May 17, 1918, data was compiled every day on the outside temperature, the inside temperature and the current consumption. The outside and inside temperatures were taken by a recording curve drawing thermometer and the consumption was registered on a recording watt meter. The outside thermometer was placed in a favorable location for obtaining the correct

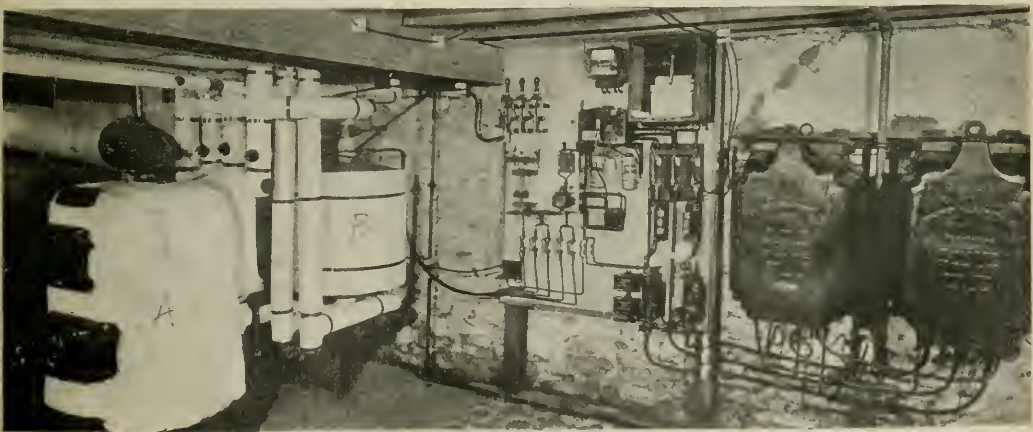


Fig. 1—General view of installation in Mr. Kitchen's basement—A and B respectively the coal and electric boilers

outdoor reading and corresponded very closely with the readings taken at the Observatory and published day by day. The inside thermometer was placed as nearly as possible in the centre of the house, on the ground floor, the rooms being connected in the usual way by open doorways, so that the whole house was at the same temperature throughout.

The house is a detached semi-bungalow type with about two feet of space on one side and seven or eight feet on the other. Tyndall Avenue runs north and south and No. 23 is on the east side so that the house is facing west. It is the regular builders' type, 23,000 cubic feet in volume, 8 rooms, brick walls, wood shingles. The maximum capacity of the heater elements is 24 kilowatts, so that the installation works out at 1.04 watts per cubic foot of air space. The windows and doors are equipped with metal weather strip, but there are no double windows or doors and no vestibule.

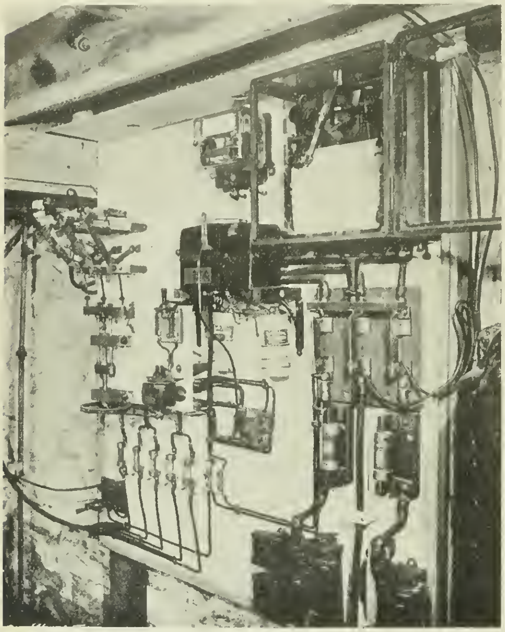


Fig. 2—Close up view of control equipment

It is important to remember, too, that these figures were taken for the coldest winter ever recorded in the city of Toronto, compared with which the present January feels like regular summer weather.

Apparatus and Control

When the house was built it was equipped with an ordinary hot water heating system. For the purpose of electric heating the coal furnace was simply paralleled with a hot water boiler two feet in diameter and two feet high, which was equipped with five 4.8 kw. nichrome heating elements immersed in the water. The elements and the tank were enamelled inside with "Bakelite." The outside of the tank was covered with 2 in. of corrugated asbestos covering. The five elements were separately fused and connected to a 3-pole circuit breaker, so that two of the poles had each two feeders in parallel and the other pole had one feeder, this method being used for fineness of control.

As the electric boiler was paralleled with the standard coal heat boiler, circulation was prevented through the latter by

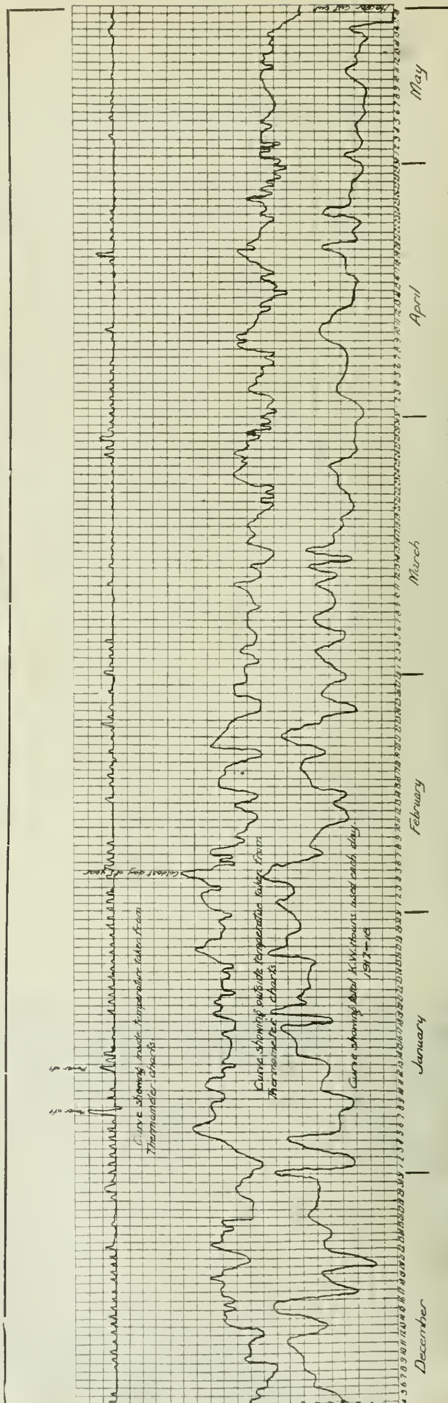


Fig. 3—Three curves showing respectively the kilowatt hour consumption, the outdoor temperature and the indoor temperature, all recorded by graphic instruments. Note the very low outdoor temperatures prevailing in 1917-18 in Canada, the coldest winter on record. Yet the indoor curve is quite regular, showing the efficiency of electric heating.

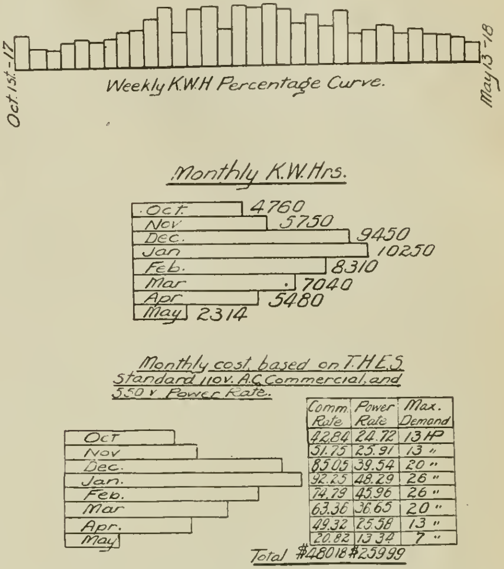
Table I

Weekly	KW. Hours
Oct. 1 to Oct. 8	1440
Oct. 8 to Oct 15	890
Oct. 15 to Oct. 22	870
Oct. 22 to Oct. 29	1080
Oct. 29 to Nov. 5	1250
Nov. 5 to Nov. 12	1120
Nov. 12 to Nov. 19	1210
Nov. 19 to Nov. 26	1610
Nov. 26 to Dec. 3	1580
Dec. 3 to Dec. 10	2020
Dec. 10 to Dec. 17	2570
Dec. 17 to Dec. 24	1440
Dec. 24 to Dec. 31	2430
Dec. 31 to Jan. 7	2580
Jan. 7 to Jan. 14	1580
Jan. 14 to Jan. 21	2560
Jan. 21 to Jan. 28	2500
Jan. 28 to Feb. 4	2600
Feb. 4 to Feb. 11	2440
Feb. 11 to Feb. 18	1750
Feb. 18 to Feb. 25	2130
Feb. 25 to Mar. 4	1670
Mar. 4 to Mar. 11	2330
Mar. 11 to Mar. 18	1310
Mar. 18 to Mar. 25	1490
Mar. 25 to Apr. 1	1620
Apr. 1 to Apr. 8	1270
Apr. 8 to Apr. 15	1490
Apr. 15 to Apr. 22	1250
Apr. 22 to Apr. 29	1220
Apr. 29 to May 6	1010
May 6 to May 13	801

the use of stop cocks on the hot water feed. These can be seen in the photograph of the installation. By turning these cocks at any time the system could be heated from the coal furnace or, indeed, both sources of heat could be used in parallel. However, this arrangement was simply for emergency purpose as it was not found necessary, even at 20 degrees below zero, to requisition the coal bin.

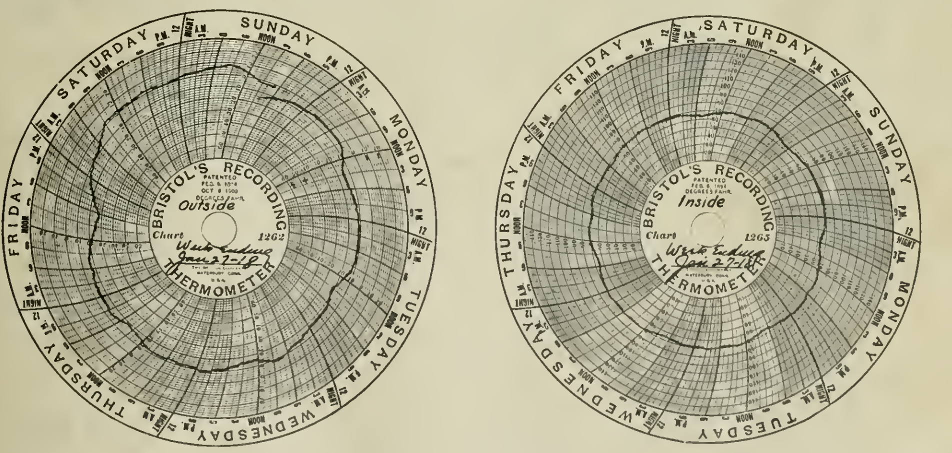
The control consists of a Minneapolis thermostat placed centrally about four feet above the floor on the first floor, (close to the indoor recording thermometer spoken of above). This was connected to a standard Minneapolis motor which operated a control switch which in turn opened and closed the circuit breaker of the heater elements. The control and supply equipment is shown in detail in Fig. 2. This automatic equipment worked without fail throughout the winter and gave absolutely no trouble, keeping the temperature of the house at any pre-determined degree. The whole of the interior of the house was heated exactly as it would have been if coal had been used. Mr. Kitchen is also authority for the statement, and indeed this is borne out entirely by the chart, Fig. 3, that a much more even temperature was obtained throughout than would have been possible with coal

(Concluded on page 30)



Comm. Rate	Power Rate	Max. Demand
42.84	24.72	13 HP
51.75	25.91	13 "
85.05	39.54	20 "
92.25	48.29	26 "
74.79	45.96	26 "
63.36	36.65	20 "
49.32	25.58	13 "
20.82	13.34	7 "
Total $480.18	$259.99	

Tables II. and III.—Weekly kw.h., monthly kw.h. and monthly cost



Reproduction of recording thermometer charts for week ending January 27, 1918

Statistical Analysis of the Central Electrical Station Situation of Canada

(From our Special Ottawa Correspondent)

Electrical energy provides an ideal source of power for practically all classes of manufacturing, for the operation of street railways, for the operation of mines, for municipal and domestic lighting, and for innummerable other activities. Its use in these fields is developing with remarkable rapidity. Other fields, such as the electrification of steam railroads, the smelting of ores and the expansion and increasing scope of electro-chemical and electro-metallurgical industries, offer vast scope for future development. The growth of the central station industry in Canada has been rapid, particularly during recent years. The larger electrical systems, both commercial and publicly owned, have been widely extended from year to year, opening up new territory in the electrical distribution field.

In order to properly measure the scope of the industry and to gauge its importance to commercial and industrial interests, the Dominion Water Power Branch of the Department of the Interior, in co-operation with the Dominion Bureau of Statistics of the Department of Trade and Commerce, has had under way during the past year, an exhaustive analysis of the central electric stations of the Dominion. The analysis of the statistics collected has been completed within the past few days. As some time must elapse before the complete report can be published and distributed, a brief synopsis of the statistical data has been prepared.

The report consists essentially of two sections: the first comprising the introduction and an analysis of the statistics, the second forming a comprehensive directory of the central electric stations of the Dominion The purpose lying behind the compilation of the data is four fold.

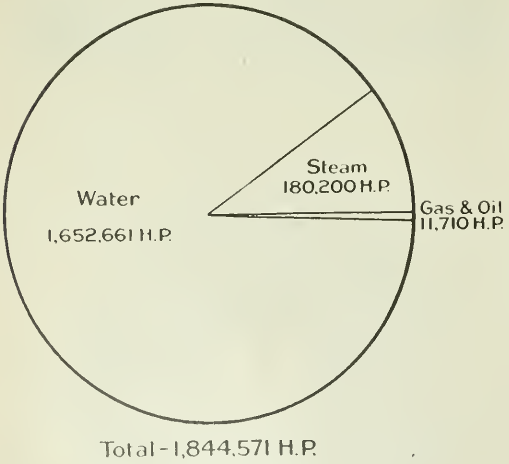


Fig. 1—Central Stations—Character of Power, 1917

1st.—A stock taking of Canada's present central station facilities with provision for expansion.

2nd.—An analysis of the statistical data collected, for the purpose of noting the characteristics and trend of the industry.

3rd.—The preparation of a complete directory of the central station industry covering concisely and systematically the principal features of the commercial and publicly owned systems and stations in operation throughout the Dominion.

4th.—Making available to those interested the locations where blocks of electrical energy are for sale, the prices at which this power is obtainable and the transportation facilities available in the vicinity.

In considering the statistics which are summarized hereunder, it should be borne in mind that the figures have reference solely to central electric stations, that is, to stations which are engaged in the distribution and sale of electrical energy. Where central stations are interwoven with other activities, such as the operation of electric railways, of mines, of pulp mills or of other industrial enterprises, the central station equipment, capitalization and other statistical data secured has been wholly diversed from the allied industry. This line of severance has been drawn through the entire statistical analysis. Central stations purchasing power in bulk for purposes of re-sale are included in the financial and staff statistics.

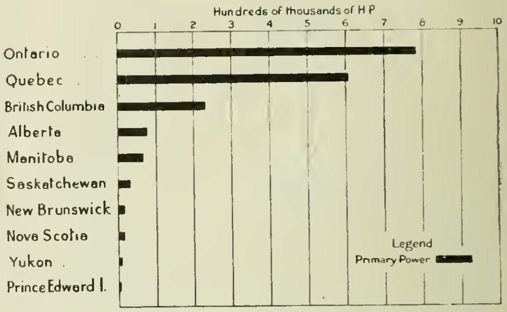


Fig. 2—Central Stations—Total primary power by provinces, 1917

A summary of the statistics is presented in Table 1, which analyzes the outstanding features disclosed by the census returns, and shows the relationship between commercial and municipal or publicly owned stations.

The total number of central electric stations recorded is 666, of which 323 are commercial stations and 343 are municipal. Examination of the figures however shows that the excess in municipal stations is attributable to the non-generating station. Ot the stations with generating equipment, 296 are commercial and 174 are municipal. Of the stations without generating equipment 27 are commercial stations and 169 are municipal. The Hydro-Electric Power System of Ontario is largely responsible for the large proportion of municipal stations purchasing power in bulk.

The outstanding features of the statistics are covered in the succeeding tables.

Power Equipment Installed.

Table 2 summarizes by provinces the number, kind and horse power of the primary power machines installed in central electric stations on January 1st, 1918. The primary power totals 1,844,571 h.p., of which 78.3 per cent. or 1,444,314 h.p., is installed in commercial stations and 21.7 per cent. or 400,257 h.p., in municipal stations. Of the total primary horse power installed 1,652,661 h.p. is derived from water, 180,200 from steam, and 11,710 from gas and oil. From the above figures it will be noted the 89.6 per cent. of the entire primary power in central stations in Canada is derived from water.

Power Equipment per Capita.

Table 3, showing the relation of the primary power installation to the population by provinces, affords an interesting basis for comparison and analysis. The total primary power installed in central electric stations throughout the Dominion averages 221 h.p. per thousand population. Yukon averages the highest with 1,206 h.p. per thousand population, British Columbia coming next with 376 per thousand, Ontario, with 286 per thousand; Quebec, 271 per thousand; Manitoba, 118 per thousand; New Brunswick, 49 per thousand; Nova Scotia, 34 per thousand; and Prince Edward Island, 13 per thousand population. Population by provinces is the only feasible basis available for making a per capita analysis of the central station industry. The occupation of the population, and its varied density in different localities have a direct bearing on the market for electrical power, and consideration of these phases will assist in explaining the above variations in the per capita development.

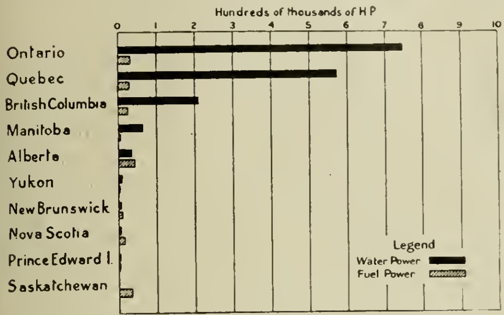


Fig. 3—Central Stations—Water vs. fuel power by provinces, 1917

Hydro-Electric Power and Central Station Industry.

One of the most important features disclosed as a result of the statistics (see Table 2) is the outstanding position which water power takes in the central station field. Out of a total installed primary capacity of 1,844,571 h.p., 1,652,661 or practically 90 per cent., is derived from water. This figure is indicative of the extent and availability of the water power resources of the Dominion and of the remarkable degree to which their adaptability for central electric station work has been appreciated in principle and realized in practice. The vast water power resources of the Dominion, the ready adaptability of hydro power to the production of electrical energy and the increasing extent and scope of economical electrical transmission, form an industrial asset which probably more than any other will ensure a full measure of future prosperity.

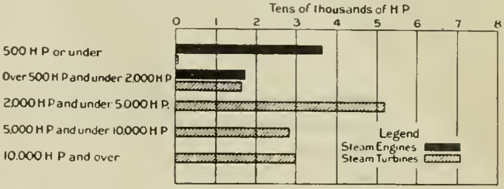


Fig. 4—Central Stations—Steam engines and steam turbines by horse power capacity of units, 1917

The Yukon develops 97.4 per cent. of its primary central energy from water. Ontario develops 95.7 per cent. from water, indicating markedly the commercial adaptability of water power for central station work, even where in competition with convenient and reasonably cheap coal supplies. Manitoba develops 95.2 per cent. of its central station energy from water, Quebec 94.9 per cent., and British Columbia 89.8 per cent. Alberta develops 43.2 per cent. from water, although

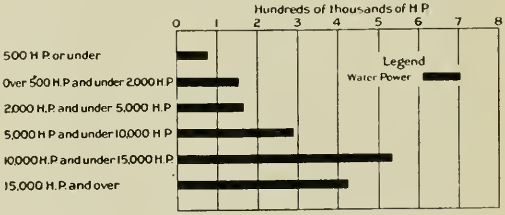


Fig. 5—Central Stations—Water wheels and turbines by horse power of units, 1917

Table 1.—Central Electric Stations:—Summary of Principal Features, 1917

	Total	Commercial stations	Municipal stations	Percent of total. Commercial	Percent of total. Municipal
1	2	3	4	5	6
Number of Stations	666	323	343	48.5	51.5
With generating equipment	470	296	174	63.0	37.0
Without generating equipment	196	27	169	13.8	86.2
Total revenue from the sale of power	$ 44,536,848	$ 29,135,399	$ 15,401,449	65.4	34.6
For lighting purposes	$ 18,403,639	$ 9,610,835	$ 8,792,804	52.2	47.8
For all other purposes	$ 26,133,209	$ 19,524,564	$ 6,608,645	74.7	25.3
Total capital invested	$356,004,168	$282,818,495	$ 73,185,673	79.5	20.5
Total number of people employed	8,847	5,135	3,712	58.0	42.0
Total salaries and wages	$ 7,777,715	$ 4,290,505	$ 3,487,210	55.2	44.8
Total horse power	1,844,571	1,444,314	400,257	78.3	21.7
(1) Steam Engines and Steam Turbines:					
Number	251	133	118	53.0	47.0
Horse power	180,200	117,452	62,748	65.2	34.8
(2) Water Wheels and Turbines:					
Number	619	456	163	73.7	26.3
Horse power	1,652,661	1,322,852	329,809	80.0	20.0
(3) Gas and Oil Engines:					
Number	113	52	61	46.0	54.0
Horse power	11,710	4,010	7,700	34.2	65.8
Electrical Generators:					
Number	943	627	316	66.5	33.5
Kv.a. capacity	1,387,521	1,086,546	300,975	78.3	21.7

an abundant supply of coal is available. New Brunswick develops 38.8 per cent. from water power, Nova Scotia 19.2 per cent. The percentage of water power used in central electric stations in Nova Scotia is low although the province is exceptionally endowed with available water power resources. An abundant coal supply indicates a reason for this condition. The city of Halifax is served from a steam driven plant, the largest central electric station in the province. The present tendency in the province is, however, towards the increased use of hydro power. In Prince Edward Island only 13.9 per cent. of the central station power is derived from water. Topography and area of the Island province explain the lack of water power resources. In Saskatchewan, no water power is developed. Here the topography of the province is solely responsible, the entire settled portion being located in prairie country, which is not naturally endowed with attractive water power sites.

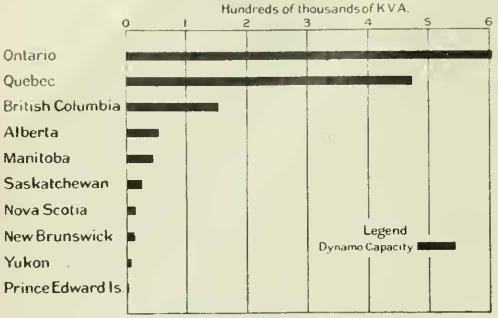


Fig. 6—Central Stations—Kv.a. capacity by provinces, 1917

Fig. 1 presents in graphical form the comparative importance of the primary sources of power in the central electric station industry in Canada. Fig. 2 presents by provinces the total primary horse power installed in central electric stations, and Fig. 3 shows the relation between installed water and fuel power in the various provinces. Fig. 4 presents the relation between steam reciprocating engines and steam turbines in central electric stations by horse power capacity of units. Fig. 5 shows the comparative total water wheel and turbine installation by horse power of units, and Fig. 6 presents by provinces the kv.a. capacity of the generators installed.

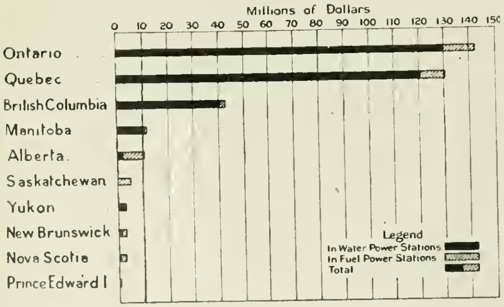


Fig. 7—Central Stations—Capital invested by provinces, 1917

Employees, Salaries and Wages.

Table 4 presents the principal features of the statistics respecting employees, salaries and wages. For the entire Dominion the number of employees in central electrical stations totals 8,847, with salaries and wages aggregating $7,777,715. Of this total 5,135 are employed in commercial stations

Table 2.—Central Electric Stations:—Number and Horse-power of Primary Power Machines, 1917

	Kind of Power																			
	Total Primary Power			Total Steam			Steam Engines			Steam Turbines			Gas and Oil Engines			Water Wheels and Turbines			Total Primary Power in	
		Horse power			Horse Power			Horse Power			Horse Power			Horse power			Horse power			
	No	Total	Per cent. of Total	No.	Total	Per cent. of col. 3	No.	Total	Per cent. of col. 3	No.	Total	Per cent. of col. 3	No.	Total	Per cent. of col. 3	No.	Total	Per cent. of col. 3	Commercial stations	Municipal stations
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Alberta..	82	75,417	4.1	57	41,862	55.5	47	12,162	16.2	10	29,700	39.3	11	975	1.3	14	32,580	43.2	49,312	26,105
British Columbia.	86	232,648	12.6	22	21,808	9.4	16	3,308	1.4	6	18,500	8.0	12	1,815	0.8	52	209,025	89.8	219,990	12,658
Manitoba	41	67,337	3.6	15	2,575	3.8	15	2,575	3.8	..	......	....	11	662	1.0	15	64,100	95.2	24,888	42,449
New Brunswick	40	17,733	1.0	20	9,790	55.2	17	5,890	33.2	3	3,900	22.0	5	1,065	6.0	15	6,878	38.8	15,488	2,245
Nova Scotia	55	17,444	0.9	39	13,950	80.0	36	7,830	44.9	3	6,120	35.1	2	140	0.8	14	3,354	19.2	13,855	3,589
Ontario	352	784,665	42.5	43	31,745	4.0	37	8,845	1.1	6	22,900	2.9	11	1,917	0.3	298	751,003	95.7	521,396	263,269
Prince Edward Isd. ...	10	1,226	0.1	2	425	34.7	2	425	34.7	..	......	....	3	631	51.4	5	170	13.9	1,226	......
Quebec	232	606,082	32.9	22	30,245	5.0	16	4,745	0.8	6	25,500	4.2	6	286	0.1	204	575,551	94.9	586,851	19,231
Saskatchewan	81	31,759	1.7	29	27,540	86.8	20	7,472	23.5	9	20,068	63.3	52	4,219	13.2	...	......	....	1,048	30,711
Yukon	4	10,260	0.6	2	260	2.6	1	60	0.6	1	200	2.0	..	......	...	2	10,000	97.4	10,260	......
Canada	**983**	**1,844,571**	**100**	**251**	**180,200**	**9.8**	**207**	**53,312**	**2.9**	**44**	**126,888**	**6.9**	**113**	**11,710**	**0.6**	**619**	**1,652,661**	**89.6**	**1,444,314**	**400,257**

Table 3.—Central Electric Stations:—Relation of Leading Items to Population by Provinces, 1917

Division	Population	Number of stations			Primary power				K.V.A. capacity of generators	
					Total horse power		Water wheel or turbine horse power			
		Total	Commercial	Municipal	Amount	H.P. per 1000 population	Amount	H.P. per 1000 population	Amount	K.V.A. per 1000 population
1	2	3	4	5	6	7	8	9	10	11
Alberta	521,852	45	23	22	75,417	145	32,580	63	52,266	100
British Columbia	615,680	28	12	16	232,648	378	209,025	340	152,743	248
Manitoba..	572,200	48	27	21	67,337	118	64,100	112	45,904	80
New Brunswick	364,375	24	15	9	17,733	49	6,878	19	12,757	35
Nova Scotia	511,829	36	23	13	17,444	34	3,354	7	14,489	28
Ontario	2,741,691	302	98	204	784,665	286	751,003	274	604,024	220
Prince Edward Is.	93,728	6	6	...	1,226	13	170	2	1,118	12
Quebec	2,239,276	122	96	26	606,082	271	575,551	257	471,969	211
Saskatchewan.	673,945	52	20	32	31,759	47	....	...	26,089	39
Yukon	8,512	3	3	...	10,260	1206	10,000	1176	6,162	724
Canada	**8,343,088**	**666**	**323**	**343**	**1,844,571**	**221**	**1,652,661**	**198**	**1,387,521**	**166**

with salaries aggregating $4,290,505, and 3,712 in municipal stations with salaries totalling $3,487,210. The total number of employees throughout the Dominion averages 4.8 per thousand installed primary horse power. The total salaries and wages paid average $4.22 per annum per installed primary horse power. Reference to the salaries and wages per installed power capacity discloses the fact that those provinces in which are located extensive transmission systems of large central station systems, show a low salary and wage bill per installed horse power capacity. These extensive systems are in all cases founded upon water power installation. On the other hand in those provinces where central station industry is wholly or largely confined to individual stations for local purposes, the unit salaries and wages cost per installed capacity is high.

Financial Statistics.

A few of the outstanding financial features of the industry are set out in Table 5. The capital actually invested in central electric station industry totals $356,004,168, of which 79.5 per cent. is invested in commercial stations and 20.5 per cent. in municipal or publicly owned stations.

The capital indirectly dependent upon electrical energy is enormous. No attempt has been made to go into this phase in this report. As showing the general dependability of the modern community upon electrical energy, reference might be made to the city of Winnipeg. According to a very careful and complete analysis made by the Dominion Water Power Branch in 1915 of the interests in Winnipeg which were to a greater or less degree dependent upon hydro-electric power derived from the Winnipeg river, it was shown that capital was involved to the extent of $169,260,963, and this on a power installation of only 55,400 h.p. The total central station power installed in the Dominion is 1,844,571 h.p.

The total revenue received from the sale of electrical energy in 1917 was $44,536,848, of which $29,135,399 was secured by commercial and $15,401,449 by municipal plants.

In securing the statistics concerning capital, the actual cash investment in the central station activities was called for, apart from the consideration of stock and bond issues. The resulting figures are therefore of particular interest as a basis for determining the investment cost per horse power installed.

The figures indicate that the actual average cost per installed horse power for the Dominion is $193. This cost includes all capital invested in construction and equipment of hydraulic works, power stations, transmission and distribution systems; real estate; cash on hand; current assets; supplies, and all other similar items.

Capital Invested in Hydro Power Central Stations.

Of special interest are the figures relating to the capital invested in hydro power central stations. The average capital cost per installed horse power for the Dominion is $188. Referring to the table, the investment per turbine horse power in Alberta appears remarkably low. This is partially explained by the fact that in the analysis the distribution system in the city of Calgary is not charged to the hydraulic developments serving the city.

Of special interest, too, is the actual cost of construction of hydro-electric power stations per installed horse power. Omitting all real estate, transmission and distribution equip-

Table 4.—Central Electric Stations:—Total Number of Employees, and Salaries and Wages per Primary Horse-power Installed, and According to Class of Station

Division	Total primary horse-power installed	Salaries, employees and wage earners		Salaries and wages		Commercial stations		Municipal Stations	
		Total number	Per 1000 H.P. installed	Total	Per H.P. installed	Total employees	Total salaries and wages	Total employees	Total salaries and wages
1	2	3	4	5	6	7	8	9	10
Alberta	75,417	438	5.8	$ 458,423	$ 6.08	156	$ 152,652	282	$ 305,771
British Columbia ..	232,648	453	2.0	$ 496,081	$ 2.13	310	$ 357,488	143	$ 138,593
Manitoba	67,337	405	6.0	$ 433,262	$ 6.44	79	$ 66,669	326	$ 366,593
New Brunswick	17,733	215	12.1	$ 155,164	$ 8.75	178	$ 125,945	37	$ 29,219
Nova Scotia	17,444	288	16.5	$ 227,874	$13.07	235	$ 193,314	53	$ 34,560
Ontario	784,665	4,147	5.3	$4,063,060	$ 5.18	1,777	$1,920,659	2,370	$2,142,401
Prince Edward Isl. ..	1,226	23	18.8	$ 17,402	$14.19	23	$ 17,402	....	....
Quebec	606,082	2,476	4.1	$1,514,186	$ 2.50	2,301	$1,361,153	175	$ 153,033
Saskatchewan	31,759	363	11.4	$ 348,952	$10.98	37	$ 31,912	326	$ 317,040
Yukon	10,260	39	3.8	$ 63,311	$ 6.17	39	$ 63,311	....	....
Canada	**1,844,571**	**8,847**	**4.8**	**$7,777,715**	**$ 4.22**	**5,135**	**$4,290,505**	**3,712**	**$3,487,210**

Table 5.—Central Electric Stations:—Capital Invested in Central Station Industry Per Primary Horse-power Installed and According to Class of Stations—and Capital Invested in Hydro Power Central Stations

	In All Central Electric Stations					In Hydro Power Central Electric Stations		
	Total primary horse power	Total Capital Invested				Total turbine horse power	Total Capital Invested	
		Amount	Per primary horse power	Total in commercial stations	Total in municipal stations		Amount	Per turbine horse power
1	2	3	4	5	6	7	8	9
Alberta	75,417	$ 11,102,6[illegible]0	$147	$ 5,634,479	$ 5,468,141	32,580	$ 2,293,537	$ 70
British Columbia .	232,648	$ 43,548,492	$187	$ 41,255,719	$ 2,292,773	209,025	$ 41,045,100	$196
Manitoba	67,337	$ 12,078,173	$179	$ 3,460,220	$ 8,617,953	64,100	$ 11,493,274	$179
New Brunswick ..	17,733	$ 3,443,848	$194	$ 2,941,569	$ 502,279	6,878	$ 1,315,723	$191
Nova Scotia	17,444	$ 3,376,405	$194	$ 2,776,101	$ 600,304	3,354	$ 686,705	$205
Ontario	784,665	$142,777,379	$182	$ 96,538,585	$46,238,794	751,003	$129,342,065	$172
Prince Edward Is.	1,226	$ 211,900	$173	$ 211,900	....	170	$ 48,400	$285
Quebec	606,082	$130,213,470	$215	$126,080,992	$ 4,132,478	575,551	$120,516,166	$209
Saskatchewan . ..	31,759	$ 5,590,515	$176	$ 257,564	$ 5,332,951	....	....	....
Yukon	10,260	$ 3,661,366	$357	$ 3,661,366	....	10,000	$ 3,363,688	$336
Canada	**1,844,571**	**$356,004,168**	**$193**	**$282,818,495**	**$73,185,673**	**1,652,661**	**$310,104,658**	**$188**

ment, seventy representative hydro-electric stations throughout the Dominion with an aggregate turbine installation of 745,797 h.p., and a total construction cost of $50,740,468 show an average cost of $69.11 per installed turbine horse power. This figure in brief represents the average capital cost of construction at the power site and is of considerable interest to engineers.

Fig. 7 presents by provinces the capital invested in water and fuel power central electric stations.

A comparison of the central station statistics of Canada with similar figures in the United States would be of interest. Unfortunately the 1917 census returns of the United States will not be ready for publication for several months. While it is scarcely fair to compare our 1917 returns with the 1912 returns in the United States the figures may be instructive. The proportion of central station power derived from water in Canada is practically 90 per cent. In the United States in 1912 the hydro power portion was 30 per cent. of the total. The water power used in central station work in Canada averages 198 installed horse power per thousand population. In the United States in 1912 the similar figure was 24.7 h.p. per thousand population.

While the ratios in the United States have undoubtedly very materially increased during the past five years, there is little doubt but that the ratios for the Dominion are still substantially in advance of those in the United States.

Heating Our Homes With Electricity

(Continued from page 25)

heating. The thermostat was set for 70 degrees from 6.30 a.m. to 10 p.m., and for a slightly lower temperature throughout the remainder of the twenty-four hours.

Temperature and Consumption Curves

It will be noticed that there are certain minor variations occurring between the kw. hour curve and the outside temperature curve. Three factors entered into these variations, namely, (1) velocity of wind, (2) direction of wind, and (3) humidity, the first two being of most importance. These, of course, apply to all types of heating and are specially noticeable with hot air systems. It would be humanly impossible to get rid of the effect of these factors unless the house were built with much thicker walls and, so, less sensitive within to conditions without. The chart on P. 24, the first of its kind, we believe, ever prepared and published, shows from day to day the indoor temperature, the outdoor temperature and the kw. hours consumed. Notice the very satisfactory regularity of the indoor temperature curve. On one occasion only, with power off, the temperature dropped to 50 degrees, though the outside temperature at the time was approximately zero. On four other occasions only for short periods did the temperature reach 60 degrees. Also it is worthy of note that during the whole period the desired temperature of 70 degrees was never exceeded.

The chart of the outside temperature shows that during the months of December, January and February the temperature hovered around the zero mark almost continuously. On February 4-5 twenty degrees below zero was reached. At this time also the maximum current consumption was required—about 475 kw.h. per day. The highest weekly consumption for the season also occurred at this time—2,600 kw.h.—though on other occasions 2,580, 2,570, 2,560 and 2,500 kw.h. were used up in the week. The weekly consumption, week by week, is shown in Table I and the monthly consumption in Table II. The total kw. hours for the season, October 1 to May 17, seven months and a half, was 52,700 kw.h.

The cost is, of course, a matter of local conditions. The domestic rate in Toronto is one cent per kw.h., less 10 per cent., on which basis the cost for the year works out $480.18. The power rate is based on the standard a.c., three phase, 25 cycle, 550 volt rate of service, namely: $1.25 per h.p. per month for the first 10 h.p. of maximum demand and $1.00 per h.p. for all excess; energy charge up to the first fifty hours monthly use of maximum demand, 1½ cent per kw.h.; additional consumption for the second fifty hours monthly use of maximum demand, ½ cent per kw.h.; remaining consumption .15 cent per kw.h.; the whole subject to a cash discount of 20 per cent. Figured on this basis the cost of heating for the whole season is $259.99. This is also shown in Table III., where it is also indicated that the maximum demand was 26 h.p. and varied from that figure down to 13 h.p. during the six winter months, dropping to 7 h.p. in May, just before the furnace was shut off.

Of course it is impossible to say what the consumption of coal would have been in this house during the winter of 1917-18, but a conservative estimate would doubtless be twelve tons, as in the winter of 1914-15, a much milder season, 10½ tons were used. Coal is now selling at $12 a ton which would bring the coal cost to $144. On the supposition that a man is paid $5.00 a month for attending the furnace for seven months—a conservative estimate again, we believe—this would bring the total coal cost to $179, considerably more than half the cost at the power rate and also considerably more than one-third the cost at the commercial rate.

For the information contained in this article we are indebted to Mr. J. B. Kitchen, himself who is certainly to be congratulated on this very fine and valuable piece of pioneer work.

Electric Railways

Financial Men Say Electric Railway Situation is Serious—Interests of Both the State and the Public Best Served by Adequate Rates*

Investments in public utilities are not protected merely by the constitutional provision against taking property without just compensation and by the moral obligation of state to protect invested capital and promote enterprises upon which the industries of the country in war and peace are so dependent. It is also now appreciated and publicly declared that the interests of the state and of the public are served and promoted by permitting rates which are sufficient both to insure adequate service and to create such credit for the operating companies as will attract the necessary capital to provide up-keep of the properties and their expansion. Thus private investment in public utility securities is protected in principle not only by the law but by the recognized interests of the state, the community and the public served.

While these principles have been so widely recognized by many commissions in recent months, and increased rates have been granted to many companies, the increases in rates to the utilities of the country as a whole have by no means equalled the increases in the costs of operation resulting from higher prices of fuel and materials and high wages. The development of commission regulation and the appreciation of its obligation to the public to encourage efficient service must operate to increase rates too low to protect interest or attract additional capital for utility expansion.

Electric Railways Particularly Affected by War

Electric railways have been particularly and seriously affected by the war through increased demands for service, fixed fares, high money rates and attenuated credit. The fundamental cause of the present conditions is the inadequacy of receipts to meet the cost of that character and extent of service rendered by many companies. The demand is constantly for service costing more than it returns. It will of course be difficult, if not impossible, to decrease the amount or lower the character of the service to which the public has become accustomed.

In the congested centres much may be done in decreasing the costs of operation through the introduction of one-man cars, skip stops, standardized equipment, staggered hours and reroutings, and the elimination of unprofitable runs. The authorities may aid in reducing the costs of operation by eliminating franchise charges and special taxes, street paving, street watering and the like.

These modifications of operating costs are at the best merely palliative. They do not alter the fundamental fact that under the present conditions and the present costs of material and labor, many street and interurban railways are furnishing, in response to the demand of the public, a service which costs more than they collect in fares. Appeals for higher rates have been inadequately met by local authorities, by state commissions, and, in cases where it has jurisdiction, by the Interstate Commerce Commission, and in some cases increased fares have caused a falling off in travel and resulted in little, if any, actual increase in gross revenue.

The community with adequate and efficient street-car service is busy, growing and prosperous; while the town, large or small, which has inadequate local transportation is dull and dead, or dying. As the prosperity of the community as such is more imporant than the convenience and comfort of the individual, so is the interest of the community in adequate transportation greater than the interest of the individuals who enjoy it. It follows that if efficient local transportation adequate to the needs and welfare of the community costs more than can be collected from the fares paid by the patrons, the excess of costs over receipts must be paid by the community in some form, or the community will suffer from the lack of that kind of transportation which it requires for its industrial and social needs.

In cases where street car operations are unprofitable because of local imposition and taxation, these burdens must be removed or private capital will not provide the service required by the public. If the street-car operations are unprofitable because the fares are too low, the public is and always will be the chief loser from low fares and the chief beneficiary from a higher fare whch will permit successful and profitable operation. If the cost of service for any reason is so much above the receipts that an increase of fares to cover the deficit would result in a decrease in the use of the service and therefore no increase in revenue, the public interest may demand that the service required be supplied at public expense supported by taxation.

The recent Bay State, and Boston Elevated acts are particularly interesting in recognizing the necessity for the continuance and expansion of efficient traction service to the extent of providing, in the Bay State case, that certain serial bond payments if not earned shall be made up out of taxation, and in the Boston Elevated case that all deficits in operation, including depreciation, renewals and interest and dividend payments shall be made up out of taxation. These two Massachusetts acts and the general one all provide for flexible fares, readily changeable, either up or down, to meet varying costs of operation and requirements of service. The result of operation under these acts will be watched with great interest, both by electric railway operators and by investors in the securities of public service corporations.

In other cases where the receipts are not sufficient to provide the costs of the service required by the public, the states or the communities served will be faced with the alternatives of either paying deficits in operation or of taking over the properties by purchase and operating them as state or municipally owned institutions. The result will be the same so far as the service costs more than the revenues —the public must pay the difference through taxation But taking over the properties involves the withdrawal of large amounts from the taxable property of the community, and all the problems and difficulties of public ownership and operation, which it is believed the American people do not desire to undertake. The whole situation is difficult and very serious.

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*Abstract in Electric Railway Journal of committee report presented before meeting of Investment Bankers' Association of America in Atlantic City on December 10, 1918.

It is believed that the study of electric railway problems by owners, operators and regulating officials, particularly if they find a basis for co-operation in the principle that the public demands and must pay for adequate local transportation, will point the way to a solution of the electric railway problem which will protect existing investment, assure the companies the credit required for expansion, and give the public the local transportation necessary to its welfare and health. The interest of the investors presents the study of this problem as one of the first duties of the public service securities committee of the Investment Bankers Association during the reconstruction period.

Depreciation Should be Provided for.

The war and the results of operation under war conditions and high costs have given the subject of depreciation more than an abstract or academic interest, since it is observable that those companies which have made adequate provision for depreciation meet the present emergencies with less difficulty than those companies which have not done so.

Public utility commissions, operators and investment bankers should all be equally interested in seeing that funds devoted to public use are not impaired through failure to make provision out of earnings for both maintenance and replacements, in such a way as to maintain the full efficiency of the property and preserve the integrity of the investment. No other course is honest, rational or expedient. It is honest, because the public should pay for the depletion of property and capital through wear and tear and obsolescence exactly as it should pay for other costs of using private capital and property for public use; rational, because in time the public would otherwise be deprived of the property and consequently of the service through its destruction in public use without replacement; expedient, because private capital can be attracted to public service only if protected against loss.

National Aspect of Utilities

The experiences of the war have confirmed the conviction of the American people that, for rapid and economical industrial production private capital under private management is more efficient than government ownership or operation, and that co-ordination in the national interest of national effort to a common end may be effected by national agencies, through general consent and co-operation without government ownership or operation or the exercise of the powers of absolute control.

State regulation and supervision is sufficient for local service; national supervision, and not only supervision, but encouragement and support, may be urged, as public service becomes increasingly national in scope and is better understood in its relations to such subjects as power supply, fuel conservation, labor economy, and the distribution of population and of wealth-producing agencies in industry.

If our national representatives take up the consideration of federal aid or supervision of public utilities as their importance to the whole country becomes more apparent, they will approach the subject with full knowledge of the effects on the country's industrial efficiency of the loss of credit of the steam railroad companies, resulting from restrictive legislation and repressive regulation by the Interstate Commerce Commission. And it may be hoped that they will give due weight to the experience of public regulation of utilities through state commissions, that the interests of the state and of the public are best served and promoted by permitting rates which are sufficient both to insure adequate service and to create such credit as will induce the investment of capital needed for expansion.

Zone System of Fare Collection

At the recent convention of the American Electric Railway Association, Mr. L. S. Storrs discussed the applicability of the zone system of fare collection to North American railway systems and maintained that little relief could be looked for in that direction. Mr. J. H. Moir, of the Edmonton Municipal Railway System, answers Mr. Storrs' argument in a current issue of the Electric Railway Journal. Mr. Moir quotes conditions in the Old Country and explains that the system, as used there, is really not so complicated as it looks on the surface. For the information of Canadian readers we reproduce Mr. Moir's letter:

Mr. Storrs maintains that the European system of collecting fares is no guide for the adoption of the zone system on American electric railways. From my experience I would say that there is no better system for large cities. A large proportion of the electric railways in the old land are able to pay dividends to the stockholders and, where municipally owned, hand over to the treasury large sums of money after taking care of interest, sinking fund and depreciation. For instance, the city of Glasgow paid over to the treasury in 1917 the sum of $250,000. Without a doubt that speaks well for the zone system there.

A 10,000
4c. Fare

From	To
N Ed	80 St
80 St	95 St
95th	111 Av
111 Av	106 Av
106 Av	101 St
101 St	109 St
109 St	122nd
122nd	108 Av
108 Av	118 Av
To	From

B 20,000
5c. Fare

From	To
N. Ed.	95 St
80 St	111 Av
95 St	106 Av
111 Av	101 St
106 Av	109 St
101 St	122nd
109 St	108 Av
122nd	118 Av
To	From

C 30,000
6c. Fare

From	To
N. Ed.	111 Av
80 St	106 Av
95 St	101 St
111 Av	109 St
106 Av	122nd
101 St	108 Av
109 St	118 Av
To	From

D 40,000
7c. Fare

From	To
N. Ed	106 Av
80 St	101 St
95 St	109 St
111 Av	122nd
106 Av	108 Av
101 St	118 Av
To	From

E 50,000
8c. Fare

From	To
N. Ed.	101 St
80 St	109 St
95 St	122nd
111 Av	108 St
106 St	118 Av
To	From

F 60,000
9c. Fare

From	To
N. Ed.	109 St
80 St	122 St
95 St	108 Av
111 Av	118 Av
To	From

G 70,000
10c. Fare

From	To
N. Ed.	122nd
80 St	108 Av
95 St	118 Av
To	From

H 80,000
11c. Fare

From	To
N. Ed.	108 Av
95 St	118 Av
To	From

I 90,000
12c. Fare
From To
North Admonton
to
118th Av

Typical tickets for a nine zone system

Mr. Storrs also gives figures comparing Glasgow with Columbus, and Bridgeport with Aberdeen, and discusses the railway facilities afforded on this continent and in Great Britain. The whole bone of contention appears to be the system to adopt for the collection of fares. According to his figures there are more miles of track in this country per 1,000 of population than in Great Britain, which clearly indicates that there are not so many passengers to be carried per car-mile—all the more in favor of the zone system.

I might say that the Glasgow Corporation Tramways carry about fifteen passengers per car-mile, and each passenger receives a punched ticket which represents a receipt for fare paid. If the conductors over there can punch tickets at the rate of 150 per car-hour, the conductors on this side should be able to perform the same duty. The different denominations of money might make it somewhat more difficult, but not enough to retard the conductors in getting all the fares.

A great deal of discussion has arisen over passengers overriding the distance paid for, but a conductor should be able to keep an eye on all passengers and see that this does not occur. The tickets or checks used are of different colors, and by these a conductor knows where a passenger should leave the car.

Discussion has also arisen as to the possibility of conductors stealing fares, but with the system of checks used this is almost impossible. The checks are numbered in series and each conductor must turn in the amount of cash received for the number of checks issued.

It would be impossible, of course, to have such low fares here as in Europe, but that is a matter for each railway to decide. It seems to me that the best fare to adopt here would be 4 cents for the first zone and 1 cent for every additional zone to the end of the line. If this should not produce sufficient revenue, the zones should be shortened, but it would be inadvisable in any case to increase the fares.

I attach sample of checks which might be used on such a system. For example, a person who wished to ride one zone would purchase a 4-cent check; two zones or one zone and a portion of another, a 5-cent check, etc. If the person wished to ride the entire distance, he could buy a 12-cent check.

The collection of fares and issuing of checks is really very simple. For example, a person takes his seat in a car, say at some point between North Edmonton and Eightieth Street, and wishes to ride to 109th Street. In this case the conductor would collect 9 cents and issue a 9-cent check, punched in the column denoting the zone where the person boarded the car. This check would indicate the destination of the passenger. Should the latter override the distance, the conductor would collect an additional 4 cents. This would probably prevent any person attempting to defraud the company a second time by overriding the distance originally paid for.

When a conductor starts on his day's work, he has a stock of checks of each denomination. The total number of each is marked down on a card or form which he carries with him. The checks are put in pads of 100 and are numbered consecutively. At the commencement of each trip the number of the uppermost check of each denomination is marked on the card. At the completion of the day's work this card, with the unsold checks, will show exactly the day's sales, and the conductor must account for the money representing these sales. In case of a shortage of cash, he must make good.

The concensus of opinion at the conference of the American Electric Railway Association was that no zone system yet adopted by the railways on the American continent has proved satisfactory, and that the flat increase in the unit fare has not given the desired results. If the European system were given a trial, I am sure the results would be satisfactory.

I think it would be inadvisable for cities with a population of less than 100,000 to adopt the zone system. The reason is that with low fares a certain density of population is essential to obtain satisfactory results. In other words, the short-haul traffic is the traffic which pays best, and a low fare would tend to encourage this branch. In smaller cities a better system would be to adopt one-man cars and a higher fare.

Edmonton is experiencing at the present time the same difficulties as most electric railways, and probably a few more owing to the excessive capital investment per head of population. We are carrying 10,400,000 passengers a year on an average fare of 5.15 cents. The total earnings for the year are $535,000, and the total expense $630,000.

If our fares were increased to four tickets for 25 cents, instead of five for 25 cents as at present and children's tickets ten for 25 cents (and there is an indication that this may take place in the near future), and if the number of passengers carried were 10,200,000 (a decrease of 200,000 being allowed because of the increase in fares), our fares would average 6 cents. The total revenue would then amount to approximately $624,000.

It would be out of the question to attempt the zone system with Edmonton's present population, as we would have to earn $90,000 more revenue to pay the additional platform expenses.

I have endeavored to demonstrate why the zone system should be adopted in large cities and the one-man car system in small cities. Should any reader desire further information with regard to the zone system, I would be very glad to take the matter up with him, as I believe this system will eventually have to be adopted.

Toronto Suburban Now Government Owned

The Toronto Suburban Railway, which operates 10.26 miles of lines on streets and highways in the western portion of Toronto and in the town of Weston, and two interurban lines on private right of way, one from Weston to Woodbridge, 13 miles; and one from Lambton to Guelph, 46.3 miles, a total of 69.53 miles, and which is controlled by Sir Wm. Mackenzie and associates, is being acquired by the Canadian Northern Railway and will be operated as part of the Canadian National Railways. The Canadian Northern is also acquiring the Toronto Eastern Railway Company's charter. This line is projected to run from Toronto to Cobourg, Ont. A contract was let and construction started in 1914, grading being done from Bowmanville west to Pickering Village, 19.5 miles, and track was laid and ballasting done from Bowmanville to Whitby, 14.5 miles. No overhead or other electrical work was done, and, owing to the war, all construction was stopped.

Moose Jaw Company May Sell to City

The Moose Jaw Electric Railway Company have just presented a report to the city council in which they offer to sell out to the city and stating if this is not considered it will be necessary for the city to grant them certain concessions in order that an adequate service may be maintained. These concessions include the cancellation of all indebtedness of the company to the city for materials or labor; the right to increase the fare to seven cents; the exemption of the company's property from taxes and mileage rates until 1930; the right to operate one-man safety cars and that certain bridge repairs be made by the city. The report further states that the company has been operating for several years during which their receipts barely covered expenses and that their present financial condition makes it absolutely necessary to either secure assistance or abandon the enterprise.

Mr. Justice Masten, in the Supreme Court, Toronto, has just awarded damages amounting to $1,000 to a woman who was suing the Toronto Street Railway Company for $4,000, as the result of injuries sustained when the street car in which she was standing came to a sudden stop at an intersection. The plaintiff, who is 66 years old, was thrown against a seat and her spine injured. She also claimed that passengers were subjected to severe jolting on account of a defective roadbed. The jury found that the car itself was defective in the knowledge of the defendants and that they were guilty of negligence in allowing it to be operated.

The Contractor-Dealer

The Public Does Not Care Very Much What An Appliance Costs—The Question They Ask Is—What Will It Do?

We in the electrical industry are creators; we are pioneers. We must make our own business. Whether our industry is one of a gross value of $6,000,000,000 or $7,000,000,000 per annum, or whether it is one of $60,000,000,000 or $70,000,000,000 per annum, depends upon the way we apply our energies and abilities.

That's what W. L. Goodwin says of the trade in the United States and presumably it's not different in Canada. In other words the business is there if we will just reach out and take it. And, truly, it often happens that we don't have to stretch our arms very far to place our hands right on something pretty good but Mr. Goodwin makes a strong point when he says we are pioneers. Selling electrical appliances is a different proposition to selling shoes, groceries, hosiery and what not—items the public have been buying so long they have forgotten that the human race ever did without them. Electrical appliances, on the other hand, have not yet become a part of the human being's daily life.

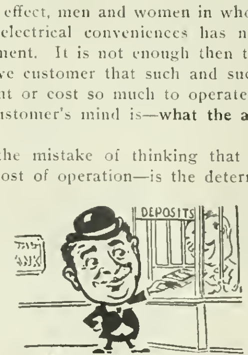
The successful merchandising of electrical goods requires, therefore, a somewhat more scientific method of approach than does the retailing of ordinary goods. That is, there is a preliminary, preparatory operation in the one case not required in the other. However, once this primary operation is completed there seems no reason why the recognized up-to-date methods of selling used by successful hardware, shoe or grocery men, should not be equally successful in the hands of the electrical dealer.

And this one primary step, as mentioned above, is necessitated by the fact that the general public don't yet "demand" electrical goods. They know they must have boots and so go and ask for them. But they go to an electrical store with their minds fully made up that such things are luxuries—at least so far as they are concerned. They are curious merely.

It follows that the successful contractor-dealer must keep this fact in mind. He is, in the vast majority of cases, dealing with skeptics, in effect, men and women in whom the need of knowledge of electrical conveniences has not yet shown signs of development. It is not enough then that he explain to his prospective customer that such and such will consume so much current or cost so much to operate. The essential thing in the customer's mind is—**what the apparatus will do.**

Don't let us make the mistake of thinking that "cost" —either initial cost or cost of operation—is the determining factor in the mind of the customer. When he is satisfied that an article will add to his own comfort or that of his family and will enable him and them to get a little more into every twenty-four hours, he won't ask the price. Everybody to-day is looking for servants. If the contractor-dealer can prove that he keeps them in stock, (and he can, if he goes to it), he will find ready sale.

So, sell your customer on the argument of what your appliances **will do**—not what they will cost.



Is this depositor a Contractor-Dealer?—We hope so

What Is Wrong With Contractor Dealers' Merchandising Methods?

During Mr. W. L. Goodwin's visit to Toronto to attend the convention of the municipal electrical engineers, on January 30-31, it is hoped that the Contractors' and Dealers' Association will be able to get him to spare them an evening. It has been suggested that Mr. Goodwin visit the various places of business of the contractor-dealers in Toronto, or as many of them as time will permit, and that later he meet them at one of their association meetings and tell them just what he thinks is wrong with the business in Toronto and where it can be improved.

On an earlier visit, Mr. Goodwin expressed himself as disappointed with the electrical stores of this city and we have pointed out on more than one occasion what a large percentage of the electrical trade is being handled through other mediums, such as hardware and drug stores. We do not minimize the difficulty in the way of changing these conditions, but neither do we believe they are insurmountable. If Mr. Goodwin can spare the time to carry out such a programme as that outlined it will be of the very greatest advantage to the electrical dealers of Toronto to give him the right-of-way into the very heart of their business methods and then listen patiently to what he has to say in the way of criticism or approval.

Now that the war is over there are few who doubt that the merchandising of electrical supplies is going to assume much larger proportions. It will be a profitable business and the question for the contractor-dealer to decide is—who is going to do this business and who is going to get this profit?

Information for Canadian Exporters

The Canadian Trade Commissioner in London, England, has advised that, while there is not the same insistence in England on the rules and regulations governing electrical equipment in this country, there are nevertheless certain requirements to be noted. These, he says, are set forth in several publications: Wiring Rules, published by the Institution of Electrical Engineers, 1 Albermarle Street, W-1, price one shilling; Memorandum by the Inspector of Factories on Electricity regulations; Mining Rules and Regulations, published by H. M. Stationery Office, price 4d.; Standardization Rules, by British Engineering Standards Association, 28 Victoria Street, S.W.-1. The wiring rules of the Institution of Electrical Engineers are adopted by practically all the insurance companies in England. The factory and mining rules are administered by the Home Office and are compulsory on all users.

Business that Awaits the Retailer

By Samuel Adams Chase*

In these days of reconstruction, it is not strange that a spirit of unrest shall have found an entrance to the field occupied by the jobber and contractor-dealer. Lawyers of the highest eminence are persuaded that both the practice of law as well as the law itself are facing changes of a radical sort. A diploma, a small black bag and a sympathetic bedside manner no longer constitute the essentials of a profitable medical career.

Change is the fundamental fact of economic progress. To recognize and accept the probability of a change is one-half of the problem; and to see its direction accurately provides the ultimate solution.

The inexperienced manufacturer of electrical appliances creates a sales policy of selling direct, forgetting the jobber, and contractor-dealer, and says they are useless; cut them out; they are carbuncles on the commercial body; they are parasites; they toil not, neither do they spin. Many of you have heard this sort of statement.

Nearly every commercial line has been attacked by this fever with the usual losses to the manufacturer, the injury to the distributor and seldom advantage to the consumer.

There is an old saying that "the longest way 'round is the shortest way home." Experimental short cuts often are costly. A multitude of greedy manufacturers have tried to sell direct at the jobber's price; a myriad of grasping retailers have tried to buy directly from the manufacturer, with the jobber's discount. So they lock horns over this trifling middle percentage and upset the stability of trade conditions very greatly to their own loss.

I am familiar with some of your problems, not all, not nearly all. But I know the confusion caused by the electric light companies when they sell electrical merchandising appliances at cost in order to increase the consumption of current. I know about the pit dug by the local contractor—into which he himself falls frequently. But although I know something of your "hard trials and great tribulations," I know also that you should occupy an impregnable stronghold.

In the first place " Possession is nine points of the law." You may say confidently with Napoleon "I am here. I shall stay." Secondly, "In union there is strength," and you will impress others through consolidating associations, as a united body.

Any plan of reconstructing the method of selling electrical merchandising appliances, through the co-operation and close alliance between the manufacturer, jobber, central station and contractor-dealer, distributing through the natural and legitimate channels will place the electrical industry in a better relation to the trade than ever before. It will make close friends of those who have sometimes been active enemies.

This would be no small accomplishment if there were nothing else; but it is only the first of a long list of benefits which will accrue—not only to the manufacturer but also to everyone interested in the electrical industry.

Why? Because the policy will give balance and stability to the commercial phase of the business. It will establish a relation which is an improvement on "live and let live" since it is based on the idea of co-operation—"live and help live."

For several years, as you know, the condition of the electrical trade in some respects has been going from bad to worse. Not that we, as manufacturers, have not made money, or that the contractor-dealers as a class have been doing business at a loss. But any business which proceeds along other than sensible roads is conducted wrongly in that particular direction in which it diverges from the path of efficiency.

We know that you live under a competition so severe that only the most robust and aggressive contractor-dealer can survive. We know that the dealer is as necessary a part of the electrical trade as the manufacturer or the jobber in the sale of electrical merchandising appliances. And, with this knowledge set clearly before us, we propose to do our utmost to assist toward reconstructing the highway of business.

Where there is a rut, we'll get out of it; where there's a steep grade, we'll go around the mountain; where there's a chasm we'll bridge it; and where there's a long detour, we'll build a short cut.

Man Gets Business Who Goes After It.

On the other hand, there is no folly greater than to fool oneself; and it is folly to assume that the distributer has a vested right to any business. He must make his claim good by performances, and he cannot perform successfully without a clear knowledge of his powers and limitations.

The manufacturers and jobbers must first get the dealer's lively sympathy and then his active co-operation, and he must assist in creating a demand for electrical marchandising appliances and do all things which are vital and necessary to merit the business.

One of the principal criticisms of the manufacturer in the past has been that the average contractor-dealer does very little to create a demand for the sale of household and other electrical appliances to the consumer. In other words, he is not a merchant.

If the contractor-dealer will become a real merchant, there is no department of selling in which the manufacturer and jobber shall not be ready and anxious to help him, and suitable advertising matter will be furnished, salesmen instructed and attractive window displays suggested and the manufacturer, jobber, central station and contractor dealer go hand in hand down the road of business prosperity.

I believe it pertinent at this time to emphasize that the manufacturers believe that the electrical dealers have not been as active as they should be in the sale of motor-driven devices and there is a great possibility in this field.

Take, for instance, six of the commonest electrically operated machines used in the home—the washing machine, the sewing machine, the ironer, the vacuum cleaner, the fan motor and the polishing and grinding motor. All of these classes of apparatus have been developed to a high degree, are manufactured in very large quantities and should be used wherever electricity is available.

Specialty Agents Show Possibilities of These Sales.

The fact that the electrical dealers have overlooked this possibility is noticeable since a number of new concerns have sprung up which do nothing but handle devices of this kind, adding to their line a full line of heating apparatus. Such dealers can now be found doing a profitable business. Their stock in trade consists of an attractive display room in a district frequented by women on their shopping tours. These dealers usually do some advertising, and in some instances solicitation through the residence district.

The electric contractor-dealer has been slow to get into this particular field, and I believe that in order to handle devices of this kind he must have an attractive store, he must be in a position to do extensive solicitation, considerable newspaper advertising and render services from time to time in connection with such devices as he has sold.

It is true that either an attractive display room or else a system of house-to-house canvass and furnishing samples free of charge are necessary. Newspaper advertising has also been effective, if the advertisements are properly timed and carefully prepared. The question of service is furthermore necessary, but the successful electrical dealers make their service feature one for building up additional business. In other words, their service men who go out to repair or adjust any device sold, open up sales for other classes of apparatus. They distribute literature and report prospects to the office, which are followed up systematically and energetically.

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*Special Representative, Westinghouse Electric & Mfg. Company

A good illustration of this service feature is that pursued by a concern out West which has recently put on the market a farm-lighting outfit. The sales organization of this company considers that it is just starting when it sells the farm-lighting outfit. It follows up the prospect with all sorts of electrical devices, such as fans, house pumps, washing machines, ironers, sewing machine motors and small motors for general power purposes. The prospect becomes a regular customer of lamps. He, undoubtedly will make extensions in time in his wiring and will require supplies. Thus, the organization becomes the sole supplier of the farmer's needs along electrical lines. If more of the electrical dealers would pursue such a policy as this they would, undoubtedly, build this business up enormously.

It would pay the electrical dealers to get in touch with the manufacturers of small motors and electrically operated devices used in the home. On the most expensive of these, extension time-payment plans are now worked out which enable the householder to finance purchases which he could not think of financing if it were necessary to raise the necessary cash.

The electrical dealer has not been alive to this situation in many localities. Manufacturers have had to establish their own branches for retailing these electrically driven devices, and as pointed out, a special class of dealer has sprung up simply because the electrical dealer has not realized the opportunity and modified his business methods to meet this new condition and established attractive retail stores.

Jobbers Planning Publicity Campaign

The Electrical Supply Jobbers Association of the United States is planning a national publicity campaign to urge upon the manufacturer and the contractor-dealer the importance of the intermediate position the jobber holds between these two extremes. There is still a marked inclination on the part of manufacturers to deal directly with the contractor-dealer and also a similar tendency on the part of the latter class to ignore the jobber, and the campaign now being arranged is calculated to convince both the manufacturer and the retailer that it would be to the benefit of each of them and in the interests of the electrical trade in every way if the jobber were to become formally recognized as a necessary "link" in the chain of distribution of electrical goods.

A report was presented at the recent Cleveland convention urging that such a publicity campaign be arranged for at once and pointing out the following advantages which should accrue as a result:

(1)—The removal from the minds of trade buyers, particularly those in the electrical trade, of the erroneous impression that the association does anything in the way of fixing resale prices.

(2)—Educating buyers of electrical merchandise to purchase of electrical jobbers rather than of hardware jobbers, drug houses or other concerns not strictly engaged in the electrical business.

(3)—Attracting the attention of manufacturers, especially new ones, to the service that members of the association may render them as mediums of distribution and marketing of their products.

(4)—Impressing upon manufacturers the advantage to them of giving due consideration to the electrical jobbers regardless of what their sales policy may be.

(5)—Educating the buyer, especially those directly in the electrical business, to buy from the jobber rather than direct from the manufacturer and giving arguments in support of this.

(6)—Calling the attention of the buyer to the stocks carried by the jobbers and the geographical distribution of them, and consequent better service that may be given by a jobber than by a manufacturer, even on that manufacturer's own line.

(7)—Educating the buyer to the wide diversity of articles and lines carried in jobber's stocks.

(8)—Directing the attention of all readers of trade journals to the fact that everything that may be advertised in the particular issue he is reading can be purchased by him from a jobber.

(9)—Directing the attention of all readers of trade journals to the fact that the membership of the association undoubtedly includes one or more jobbers in his immediate locality who are prepared to render him a distinct service in furnishing goods advertised.

(10)—Directing the attention of manufacturers to the Electrical Supply Jobbers' Association as including the best jobbers in the country, and thereby quite likely influencing the manufacturers to refer to the fact in their own advertisements that their products may be secured from members of the Electrical Supply Jobbers' Association.

(11)—Making the buyer familiar with the enormous aggregate of dollars and cents value of the stocks carried as a whole by the Electrical Supply Jobbers' Association members as a demonstration of the service they can render.

(12)—Directing the attention of electrical jobbers throughout the country, both members and non-members, to the real objects of the association and to the educational work it is carrying on for the benefit of the trade.

(13)—Counteracting by dignified and businesslike arguments any tendency on the part of the government, the manufacturer. the contractor or any other interest to fail to accord to the jobber his rightful place in the industry.

(14)—Directing the attention of the manufacturer to the enormous purchasing power of the jobber.

(15)—Directing the attention of the manufacturer to the thoroughness with which the United States is covered by the activities of the jobber.

(16)—Proving to the manufacturer that the jobber actually creates business in addition to acting as an economic distributor of the material involved.

(17)—Proving to the manufacturer that the jobber can perform the functions of warehousing and distributing more efficiently and economically than the manufacturer can himself.

(18)—Directing the buyer's attention, particularly during war times, to the fact that to take advantage of jobber's stocks is one way of co-operating with the government, in that manufacturers are not loaded up with orders for material already in the jobber's warehouse.

(19)—Directing the attention of the buyer to the service rendered by the jobber's salesmen, a small part of which nowadeys is the actual soliciting and taking of orders.

(20)—Directing the attention of the manufacturer to the economy of marketing his product through the jobber from the standpoint of accounting as well as from the standpoint of warehousing and distributing.

(21)—Creating in the minds of readers, especially those in the business, a proper realization of the jobbing business as occupying its own essential and peculiar position in the industry, and thereby counteracting the belief on the part of many central stations, and practically all contractors, that all they have to do to become jobbers is to announce the fact, rather than have them realize that it is a field requiring peculiar fitness from every standpoint.

(22)—The building up of a spirit of good will on the part of buyers toward the jobber, a ready and prompt recognition of the service he is prepared to render, and a natural inclination to make use of that service.

A movement not unlike this is under way among Canadian jobbers of electrical goods. If the jobber can demonstrate to the manufacturer and the retailer that he is a necessary part of the machinery of distribution (and we believe he can), the present moment is opportune for such action. Whether or not more electrical goods are sold in 1919 than ever before depends upon our selling organizations.

Mapping Out the Appliance Market*

Three obstacles deter the average electrical merchant from making a useful census of his local electrical buyers. Let me list these in order:

1. Failure to study out logically the facts which it is desirable to know. Through fear of involving himself in too much system, the dealer is inclined to adopt a form of record which, when complete, amounts to little more than a list of names and addresses; or, if he has not a proper fear of red tape, he incorporates in his forms spaces for an array of facts either impossible to obtain or not essential to merchandising success.

2. Discouragement due to the size of the task. The dealer forgets that he presumably is established permanently and that a census of prospective customers—like the goodwill of his business—must be a matter of growth and not a thing which can be created overnight.

3. Failure to provide for keeping the census "alive." Any prospect list, even the simplest, is a never-ending job like—let us say—window cleaning.

The second and third obstacles can be overcome only by the grit and character of the individual. If a man is discouraged at the size of a job, no amount of coaxing is going to make him tackle it successfully. He is convinced in advance that it can't be done, which is the same thing as admitting himself beaten before he starts. And by the same token, if a man hasn't the innate stick-to-itiveness to maintain his census lists after they are once in working order, he hasn't the bulldog quality necessary to present-day business success. So we will dismiss these two obstacles and get down to the practical details of how to organize a useful sales prospect census.

What are the facts which it is desirable to know about a prospect?

The first thing, obviously, is the name, address and phone number.

Next we want to know something about his home. (The writer is speaking now specifically of residential prospects; industrial and commercial prospect lists can be built up upon similar groundwork, though the details, of course, will differ.)

In regard to the prospect's home, we wish to know, first, whether or not it is wired. Then, what class of home is it?—a cottage, a mansion, or a palace? How many rooms? Is it owned by the occupant or rented? How old is it; that is to say, does it seem probable that the owner will spend money for improvements? What sort of neighborhood—one that is rising in value or one that is "going to seed"? Is there a barn or garage attached?

In regard to the prospect himself, we wish to know, first, to what station or class does he belong—workingman, office man, owner of a business, professional man (and what profession) or plutocrat? Size of family? What, approximately, is his net income? (Note the word net: a man who may be making $5,000 and has to support six children and a platoon of his wife's relatives is not so good a prospect as a man whose family consists of a wife and a Pekinese canine.) Is the prospect a free spender, a careful man or a "tightwad"? Is he progressive or not? Does he drive a car—and how big? Approximately what are the ages of the children, if any?

After the prospect has become a customer, the information outlined does not by any means lose its value; on the contrary, it is necessary to know even more about a customer than about a mere prospect. This additional information includes: How does he pay—cash, prompt, dilatory or "dead beat"? Is he difficult or easy to sell? Is he easily satisfied, exacting or unreasonable? What electrical equipment has he already bought?

These are some of the facts that it may be desirable to have covering the electrical appliance purchasers of the dealer's territory. It rests with the individual dealer's judgment which of these facts are pertinent in his case and which are superflous. He may have such familiarity with his town that he can visualize practically every building and know off-hand every necessary fact regarding each. Another dealer may have the sort of memory which enables him to keep the facts about his customers at his finger tips so that a card record of such information is mere time-wasting. This sort of memory is rare, however. Another may have an office assistant who is a veritable local "Who's Who" with all the gossip of the town on her tongue.

It rests, we repeat, with the individual dealer's judgment whether he will keep an exact, complete and painstaking census or a brief, concise mailing list. Mr. Doherty says, "The average man has no idea of analyzing his local selling prospects. He has no idea that he can make a census of the electrical buyers of his community." What he meant to say, the writer believes, is that the average man is too prone to take the easiest way. Because a job looks hard he either discreetly turns his back upon it or flim-flams himself into believing that an easy, inadequate solution of the problem "will do." So while we assert—because it is true—that the individual must decide for himself what scope his own census should cover, let us urge that no half-measures be adopted—that the proposition be faced honestly and fearlessly and solved according to cold fact, no matter how unpleasant and laborious the job may be.

Our own conception of a census card is one that visualizes the customer fully. When we pick up the record of John Smith, 18 Villa Road, we want to be able to see in our mind's eye a man who lives in a decent, ten-room house in a prosperous neighborhood, who drives a good car, who has three children from five to eleven years old, who is a careful spender but not an unreasonable customer, and whose electrical equipment consists of a flatiron, a sweeper, several good portables and a toaster. All this information can be contained on a small card; it can be collected and kept up to date with very little effort or expense, and it can be turned into cash sales. That, after all, is the thing we are after. If a census will help, start one.

The town of Ridgeville, Man., is negotiating with Mr. W. Post for a supply of electric light from a small isolated plant installed in his warehouse.

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*By Frank B. Rae, Jr., in Electrical Merchandising.

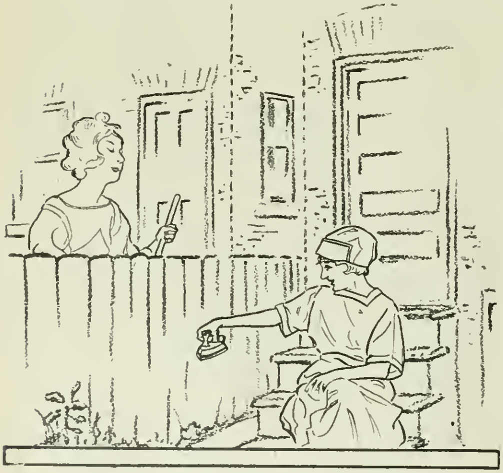
How I Increased My Sales 100 Per Cent.

[The one need of the electrical business to-day is the man who can "sell more goods." There is no longer any question of the quality of electrical appliances, no doubt that they are splendid value for money received or that the story of their usefulness and convenience has never half been told, no fear but that the public will buy when they understand the situation. All that is needed is more sales. The manufacturer, in the main, is doing all he can, and is more or less helpless—so is the jobber. **It's up to the man who retails.**

Of course there are many wide-awake contractor dealers who are increasing their business by rapid strides. There are others who are not. For this reason we have arranged to print a series of short snappy articles outlining a number of "stunts" that have been successfully used in business-getting. These articles will be entitled "How I Increased my Sales 100 Per Cent." They will be written by salesmen of undoubted ability and wide experience. Below is the first one. You will like it—and the next one will be better.—Editor.]

How I Increased my Sales 100 Per Cent.

How could I increase my volume of business? That was the question that had been forcing itself on my attention for months past. It wasn't that I was losing money on the game or indeed that there wasn't a nice little profit coming in, but it was always plain to me that the field hadn't been well worked up. We just about took care of the business that came to us, and because we gave pretty fair service and tried to please and satisfy our customers our trade was getting bigger all the time. Still I felt that we weren't quite doing our duty to the public, to say nothing of the manufacturer. If No. 36 Southam Street bought an iron or a percolator or a toaster, then I said to myself, the same appliance is good for No. 34 and 38, No. 32, and No. 40 and so on.



Discussed the new iron over the back yard fence

This gave me an idea that has been the means of bringing me in a good many sales and it worked very smoothly, as follows: Whenever we sold an appliance to Mrs. Jones, 25 Smith Street, we immediately consulted the directory and wrote a short letter to her neighbors living at No. 23 and No. 27. The letter ran something like this:

Dear Mrs. ——

You will be interested in knowing that we are selling quite a number of our —— irons on your street. Yesterday Mrs. Jones, your next door neighbor, bought one from us. There is no single item in the home that we know of that gives so much satisfaction and saves labor to such an extent as an electric iron. We shall be glad to have you drop in and see this iron demonstrated or, perhaps you'll have a chance to ask Mrs. Jones what she thinks of hers. If you'd like it we'll send you one on trial.

Yours faithfully,
J— W— & Company.

Well, it was surprising how many sales this scheme brought us in. Some women who were friendly with their neighbors would ask their opinions and buy accordingly. Others who were not on speaking terms would buy because they would not have their neighbors outdo them. On more than one occasion ladies have told me it was the means of getting much better acquainted with their neighbors, at which they were mutually pleased. No one resented the information being given out. What woman is not proud to have her neighbors know she has bought something?

This "stunt" worked better in some sections than others. It is not much use in the very wealthy districts, but rather among the medium-priced homes. On some streets it was the means of more than doubling my business last year. Next issue I'll tell you about another little scheme that worked wonders, too.

Who Said Service?

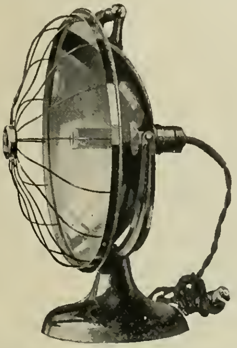
Two words in the English language that show unmistakable evidence of being worked to death are "co-operation" and "service." Yet one sees all too little evidence of the concrete things for which these words are the names. We deplore every day the lack of co-operation, and as for service, it is so rare that the few isolated examples of it are made the texts of long sermons. Service in fact is probably appreciated by all, attempted by a few and systematically practiced by—none. Here is an example in point, which by the way not only shows its importance, but that its omission, even in isolated cases, is apt to be a species of commercial suicide:

An electrical contractor-dealer was agent for a window light time clock and succeeded in placing one with a large firm in his district. A little later the key to wind the clock was lost and the customer applied to the dealer for a new one. The dealer said he would write to his principals at once. The customer inquired again in a few days and the dealer said he would write again. Finally, after several weeks delay, the customer wrote direct to the manufacturer and received his key in three days. The unfortunate sequel, although the natural one, is that the customer in acknowledging the prompt receipt of his key, suggested to the manufacturer that if he had a more reliable representative in this district he might do more business.

Now where the fault lay we do not, of course, know, but the customer is firmly of the opinion that the dealer was careless and indifferent. On the other hand this conclusion may be wrong and the dealer may be able to explain the whole matter. It shows, however, the value of prompt service and the troubles constantly lurking around the corner for the man who even once fails to make good.

Cosy-Glow Radiators

The Westinghouse Company have added the "Cosy-glow" radiator, illustrated herewith, to their electrical appliance list. It is a substantially built appliance, mounted in searchlight fashion so that it will throw heat in any direction. The heating unit, easily removable, is wound on a porcelain cylinder and is protected by a stout copper wire guard, which can be removed, when cleaning the reflector. The reflector, which aids in the proper spread of the heat rays, is built of polished copper, neatly finished.



Kingston's Electrical Men Public Spirited

Mr. H. W. Newman, recently elected mayor for Kingston, Ont., has been in the electrical business in that city for eleven years. He is a native of Kingston and has lived there all his life. He employs a staff of twenty men and during the war did a great deal of work fitting out military barracks in the Third Military District. Mr. Newman has also carried out many other important government contracts, including the lighting of the Causeway between Kingston and Barriefield, and the lighting of several military hospitals. He has been a member of the Kingston city council for five years, serving on all important committees. During the year 1918 he was chairman of the Health Committee and is regarded by many as the "father of daylight saving," having brought the matter before the Ontario Associated Boards of Trade and worked unceasingly to have the measure put through. He brought the matter before the local council and was successful in having a resolution passed in favor of it. In addition to being a successful administrator of civic affairs, Mr. Newman is also a thorough business man, always on the lookout for new ideas and possessed of the "pep" that makes the wheels go round. The city of Kingston is surely in very capable hands for the coming year.

Mr. W. H. Newman, Mayor of Kingston

Mr. James Halliday, who has just been elected by acclamation reeve of Portsmouth for a sixth term, and whose place of business is at the corner of King and Princess Streets, Kingston, Ont., has been in the electrical business for twenty-five years. He made his start in the electric light plant at Gananoque, Ont., owned by Mr. J. M. Campbell, of Kingston. After serving there for some time he went to Kingston, taking a position with the Kingston Light, Heat and Power Company. Later on he became connected with the Kingston Street Railway Company and served this company for six and a half years as electrical superintendent. He left the railway company to go into business for himself and in the quarter of a century he has been thus engaged has made a splendid success of his business. He is wide-awake and up-to-date and his record is one that any man might well be proud of. He has taken a very keen interest in the village of Portsmouth, in which he resides, as can readily be seen by the results of the recent elections. He is also a member of the Frontenac County Council and in the year 1916 had the honor of being elected Warden.

Mr. James Halliday, Reeve of Portsmouth

On January 1st, the Canadian SKF Co., of Toronto, opened a sales office at 412 St. James Street W., Montreal, Que., under the direction of Mr. Geo. Sheppard, where they will carry a large stock of double row self-aligning ball bearings, single row ball bearings, automatic drill chucks, ball bearing hangers and pillow blocks and "Quality" steel balls. It is intended to give to Eastern users the best service possible in the matter of shipment and also to extend the SKF Engineering Service for ball bearing designs and applications.

Current News and Notes

Gravelbourg, Sask.

Mr. Samuel Chevrier, of Gravelbourg, Sask., is forming a company for the purpose of installing an electric light plant, with necessary distributing equipment, in that town.

Halifax, N. S.

A contract has been let for the construction of a new power house for the Halifax Shipyards, Limited, to cost about $60,000.

Hawarden, Sask.

The town council of Harwarden, Sask., is negotiating with the Torgenson Garage Company with a view to granting this company a franchise to install and operate an electric lighting system.

London, Ont

The Canadian Electric & Manufacturing Company. London, Ont., has sold out to the Western Ontario Electric Company.

The question of a municipal telephone system is receiving considerable discussion in London, Ont. Mayor C. R. Somerville inclines to the belief that government control of the Bell Telephone Company's rates would be more preferable although Mr. E. V. Buchanan, manager of the public utilities commission is quoted as saying that the matter of municipal telephones for the whole province, as well as London, is well worth a thorough investigation.

A report is current that the London & Lake Erie Railway may be taken over and operated by a new company. It is further stated that necessary improvements will be made to put the line on a parallel with other up-to-date electric railways and also that the tracks will be re-routed through St. Thomas so as not to run over the St. Thomas city lines as formerly.

Ottawa, Ont.

The ratepayers of Ottawa, Ont., voted on January 1, in favor of taking over the Ottawa Electric Railway in 1923. when the franchise expires, and operating it as a municipal enterprise.

Portage la Prairie, Man.

The question is again being raised of a transmission line from Winnipeg to Portage la Prairie, the estimated cost being in the neighborhood of $375,000. The matter will come before the local legislature at the next session.

St. Boniface, Man.

The building of a new telephone exchange building for the Government telephones at St. Boniface, Man., is likely to be proceeded with in the spring. This project was held up by the war.

Toronto, Ont.

Wage increases ranging from eight and a-half per cent. to eleven and a-half per cent, have been granted to electricians and linemen of the Electrical Workers' Union, employed on the Toronto Hydro-electric System.

Passengers carried by the Toronto Street Railway in 1918 numbered 166,000,000. The gross income was $6,618,000 and the city's share amounted to $1,300,000. The increase in passengers carried, over 1917, amounts to 8,000,000.

Toronto's street lighting will, it is said, be on a "peace basis" by March 1. There are some 15,000 lamps to be relighted.

The revenue of the Toronto civic car lines during 1918 amounted to $331,896, as compared with $278,147 in 1917. The estimated cost of operation was $325,879; debt charges amount to $171,064, which, after allowing $1,500 revenue from advertising privileges, leaves a deficit of $163,547.

Trenton, Ont.

A 44,000 volt transmission line is being erected from Trenton to Picton, Ont., by the Hydro-electric Power Commission. It is expected this line will be completed by the end of January. An out-door type sub-station is being erected at Picton and power will be turned on some time in February.

Wellington, Ont.

The municipality of Wellington, Ont., has purchased the local distribution system of the Nyles Seed Company and will secure a supply of power from the Hydro-electric Power Commission. An out-door type sub-station is being erected at this place which will also supply the town of Bloomfield.

Winnipeg, Man.

The Canadian Pacific Railway telegraph office, Winnipeg, is being moved from the present location at the corner of Portage Avenue and Main Street to a building a few doors north. It is estimated the work will cost in the neighborhood of $50,000.

Personals

Mr. Kenneth J. Dunstan, division manager Bell Telephone Company, has been elected president of the Toronto Board of Trade. Mr. Dunstan is one of the best known electrical men and one of the most active, both in his own sphere and outside it, in the province, and his election to this office, which was unanimous, shows that all Toronto business men alike hold him in the highest esteem.

Mr. E. F. Seixas, who for the past nineteen years has been general manager of the Niagara, St. Catharines & Toronto Railway, has been appointed general manager of the Monterey Railway, Light, Heat & Power Co., at Monterey, Mexico.

Mr. Edward McGivern, master mechanic on the Chippewa development of the Ontario Hydro, has resigned to accept a position as superintendent of works on section two, Welland Ship Canal.

Mr. H. H. Couzens, general manager Toronto Hydro-electric System, has been elected a Board of Trade representative on the Canadian National Exhibition Board.

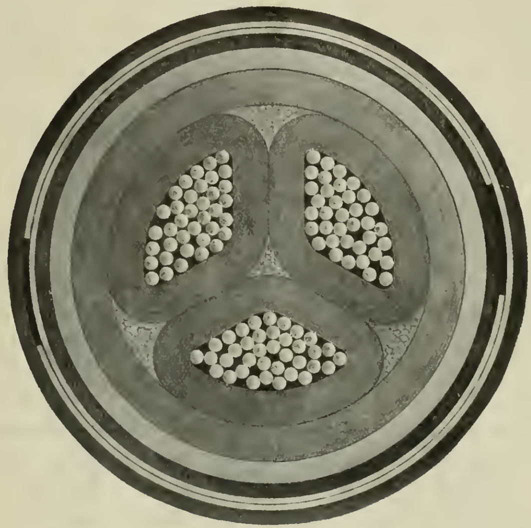
Mr. Geo. H. Olney has resumed his old position as managing director of The Eugene F. Phillips Electrical Works, Limited., Montreal.

Obituary

James A. Collie, pioneer telegraph operator, died recently in Montreal. He started with the C. N. W., in 1885, transferred to the C. P. R., in August. 1886, a month after that company opened its commercial wires to the public and had been in continuous service since then.

Mr. V. I. Smart, formerly Professor of Railway Engineering and Transportation, McGill University, and Mr. J. A. Burnett, formerly electrical engineer, Grand Trunk Railway System, are now associated as consulting engineers, located at 821 New Birks Building, Montreal. The lines handled will be civil, electrical and mechanical engineering.

POWER CABLE



350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

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Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary Vancouver

THE TOWN OF LLOYDMINSTER

PROVINCE OF SASKATCHEWAN.

willing, subject to the approval of the rate payers, to award an exclusive Franchise for a period of fifteen years covering the sale of light and power in the Town.

Service required to be the Standard Alternating, 60 cycle.

Applications to be in not later than 15th of February, 1919.

For full particulars apply to the Town Clerk.

Town of Lloydminster,
Saskatchewan.

2-3

125-H.P. CROCKER-WHEELER D. C. MOTOR

230 v., 440 amp., 500 r.p.m., series wound. Practically new, with automatic starter, Electric Control & Mfg. Co. form A. S. B. K. Located in Brooklyn.

FRED S. CARVER,
8 W. 40th St., New York City.

2-3

POSITIONS VACANT

Engineer to take charge of electric power plant and waterworks.

State qualifications and salary, with references.

Orillia Water, Light and Power Commission,
Orillia, Ont.

2-3

Induction Motors Wanted

One each 15, 25, 35, 50 H.P., 550 volt, 60 cycle, 2 phase Would consider other voltages or three phase State full particulars and best cash price. Address Box 843, Electrical News, Toronto, Ont

3-t.f

Letting the Flashlights Sell Themselves

A small dealer on a side street devised a very original way of calling attention to his flashlights. His store was long and narrow and the street outside was poorly lighted. In the rear of the store (which was visible from the window front) the dealer rigged up three flashlights which he operated from separate toy transformers instead of the usual batteries. Each transformer was put in circuit with a flasher, timed so that no two were on at the same time.

At night, after business hours, the store was left totally dark except for the intermittent gleam of the flashlights. Each light illuminated a sign. One sign read:

Here It Is!
The Flashlight locates things quickly.

Another sign read:

Stop in and get a Flashlight
on the way by tomorrow morning—
Price $1.00.
We open at 8 o'clock.

The third sign read:

Drop your name and address through the letter-slot—We will mail you a flashlight C. O. D. Price $1.00.

—Electrical Merchandising.

B. R. T. in Receiver's Hands

Ex-Secretary of War Lindley M. Garrison, has been appointed temporary receiver of the Brooklyn Rapid Transit Railroad Company, the New York Municipal Railroad Corporation, and the New York Consolidated Railroad Corporation, these two being subsidiaries of the Brooklyn Rapid Transit Company. The companies did not oppose the action, for they felt that they would be subserved by a temporary receivership.—Electric Railway Journal.

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of NEW and USED

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
2	52	3	25	550	720	Lancashire
1	50	3	25	550	725	Westg.
1	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	2	60	220	720	Fbks.-M.
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	20	3	25	550	710	Westg.
1	15	3	25	550	1500	C. G. E.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	Westg.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
5	4	3	25	550	1400	Excelsior
1	3	3	25	550	1500	C. G. E.
1	3	3	25	550	1400	Excelsior
1	1	3	25	550	1400	Excelsior

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H. W. PETRIE, Limited

Front St. West - Toronto, Ont.

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New and Slightly Used Motors at Very Attractive Prices

Immediate Delivery

5 to 100 H. P., 25 Cycle, 550 Volt, 3 Phase
5 to 125 " 60 " 550 " 3 "
5 to 100 " 60 " 220 " 2 or 3 "

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Generation, Transmission and Application of Electricity

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Ontario Electrical Men Prepare to Practice the Goodwin Policy

W. L. Goodwin gave the electrical men of Ontario province a new vision on January 30 and 31, when he visited Toronto and addressed, at different times, gatherings of municipal engineers, manufacturers, jobbers and contractor-dealers. The engineers started it with their semi-annual convention by inviting Mr. Goodwin to be present on Friday morning and explain in detail his plan of organization. The manufacturers and jobbers took advantage of the opportunity to secure him for Friday afternoon and in the evening he met the contractor-dealers and gave them such a heart-to-heart talk as will continue to bear fruit for many days to come.

There is one fact that now stands out more prominently as the result of Mr. Goodwin's visit—the aim of every branch of the electrical industry is the same; every one in it, the central station, the manufacturer, the jobber and the contractor-dealer are working for the same goal—bigger sales of electrical goods. In the past the manufacturer has been inclined to say to the jobber and the jobber to the retailer—"Where would you be if it were not for us?" The dealer and jobber respectively replied: "And where would **you** be if it were not for **us?**" Mr. Goodwin offers a new viewpoint—"Where would any of us be if it were not for all of us?" In so doing he demonstrates that the interests of all are intimately bound up together. The space previously looked upon as a sparring "ring" he transforms into a round table of get-together discussions. Closer contact shows each that the "other fellow," so long considered a knave and a rascal, is really an honest man, and with the realization of this fact our suspicions disappear, our common sense gets the better of our prejudices and our imaginary feelings of diversified and opponent aims vanish into thin mist.

It may be too early to state definitely that the Goodwin plan of organization is actually applied in Canada to-day as the result of Mr. Goodwin's propaganda work, but we believe we are quite within the mark in saying that the various elements in the trade are more nearly in synchronism than they have ever been before. And, by the way, that word synchronism was used to good effect by Mr. Goodwin in paralleling the relationship between the various "machines" in the electrical industry and the various machines in a power house when he pointed to the inefficient results if electric generators do not properly synchronize, which is no worse than the chaotic state of the whole industry to-day as the result of a lack of general co-operation.

The manufacturers are well on the way to organization; so are the jobbers. The contractor-dealers are already prepared. Regarding the central station situation, there is the Canadian Electrical Association and the Association of Municipal Electrical Engineers. The latter organization practically committed itself to support the scheme, but so far as we know the matter has not as yet been discussed before the private companies. This would seem to be a step for the very near future, for no plan of general co-operation can be a real success unless everybody joins in. The general plan, as it will likely work out finally, calls for representatives chosen from every organization or association covering a distinct field, in the industry. These representatives would meet as a joint executive to discuss all points at issue between the various sections and reach an amicable understanding. It is thus evident that nothing less than a full representation could really bring about co-operation and coordination in fact.

Clearing Houses Also Needed for Technical Men

The Canadian Government is establishing employment bureaus all over Canada—some 65 in all—which will, in effect, act as clearing houses where employers requiring labor and laborers looking for employment may get in touch with one another. Apparently, however, the scheme was not designed for any particular class, or perhaps it would be nearer the fact to say it was only designed for one class, namely, the laborer, who, on account of his greater numbers and his natural limitations for getting in touch with any employment except that nearest to hand, naturally will monopolize the government's efforts. Yet there are other classes of returned men for which it is just as essential that provision be made. Indeed insofar as the development work of the country is concerned it is of the very greatest importance that men of constructive ability should be utilized as soon as possible, as their work must necessarily precede that of the mechanical trades. For this reason it is urgent that engineers and technical men, men with construction experience or who have held positions which developed organization ability, should be given congenial employment the very moment they are discharged from military service. Aside from the fact, of course, that the members of the mechanical trade must be fed and clothed their employment necessarily follows by a few weeks, or months, as the case may be, the employment of the man with technical or organization training.

One cannot but realize that the plan of the government is incomplete so far as the professional man is concerned.

We understand that representations are being made in the proper quarters to have the weak points in the plan strengthened up. The proposals will no doubt take cognizance of the fact that the technical man is not quite so local in his activities, which will make it less necessary to have the offices close together—probably one or two in each province will be sufficient. These, doubtless, should be in charge of technical men who have been overseas. The immediate work of these officials would seem to be the obtaining of a list of positions vacant from municipalities, private corporations, and others requiring the services of technical men, and a compilation of the experience, technical training, record, etc., of the men whose services are at disposal.

It must be remembered, however, that the success of any such scheme as this is dependent upon the demand for men being equal to the supply. At the present moment this does not appear to be the case. The government has said definitely "We will see that there is no unemployment." So far they have not lived up to this promise and the establishment of employment bureaus when there is no employment is not a solution.

Electric Club of Toronto Hold Record Meetings

Sir Robert Falconer, president of the University of Toronto, addressed the Electric Club of Toronto at their luncheon on Friday, January, 24th, on the subject: "Educational Adjustments Resulting from the War." Sir Robert emphasized the necessity of correcting the error existing in the average mind that the education of the future will be materially different from that in the past. He pointed out that idealism has existed to a very marked degree in the teaching of scientists and educationalists long before the war and that the only change we could hope for would be a purer atmosphere and in general more favorable conditions which would make it possible now for the first time to convert our ideals into realities. Sir Robert compared the German ideal with those of the nations at war with her. One was a subservience of the rights and liberties of the individual that the nation, as a unit, might be efficient. The other worked for the same efficiency through the development of each individual. The first idea represented individual slavery; the second individual freedom. It was for this we have fought for four years, and it is this personal freedom that will now make possible a more perfect application and realization of the worth-while things in life.

The speaker outlined briefly the general lines along which he considered education should proceed. The idea that a university training was for any particular class of stratum of society was entirely wrong. On the other hand such education as our universities give would be unfit and unwise for all. The training of each individual should be such that he would be enabled to make the best use of his natural gifts so that in the aggregate the nation would be applying their ability at maximum efficiency. This would mean the highest national efficiency—an efficiency quite as great as the German ideal and based on an infinitely more permanent and more human foundation.

Sir Robert closed with an appeal for the more generous recognition of the financial needs of education. We readily provide money for the establishment of industries from which we do not hope to receive dividends for many years to come. Surely we should not be less generous in the development of our young men and women upon whom the future of our national success so absolutely depends.

The largest attendance in the history of the club greeted Dr. F. B. Jewett, at the February 7 luncheon, when the distinguished guest described some recent developments in "Wireless Telegraphy. Dr. Jewett is director of the Research Branch of the Bell Telephone System and Chief Engineer of the Western Electric Company, and has played a most important part in the development of wireless communication for war purposes. Dr. Jewett described the earlier experiments resulting finally in connecting this continent with Europe. For the last two years, however, all the energies of his laboratory had been devoted to the application of wireless to aviation, and naval operation and control. The final result is that aviators are now able to communicate with one another and with ground stations, and naval operations have been tremendously simplified. In the search for submarines wireless had proven particularly effective. In our next issue a more complete report of Dr. Jewett's address will be given.

Montreal Electric Club Also Very Active

Mr. H. T. Meldrum, who was for three years connected with the C. P. R. War Office Purchasing Agency in London, spoke on "Trade Opportunities," at the Montreal Electrical Luncheon, on January 15th. He remarked that up to 1914 our manufacturers were not widely known abroad, but that today a new policy was forced on the manufacturers and they were taking up this policy with a vigor and hopefulness that would not have been expected of them four years ago. Mr. Meldrum expected a considerable business to come to Canada during the reconstruction period, but at the same time believed there would be a certain amount of delay in the placing of actual contracts.

It would, he said, probably be months before a scheme of rebuilding Europe on a permanent basis was arranged for; when that business came it would be on a large scale, as enormous quantities of supplies of all kinds would be required. In the meantime manufacturers should prepare themselves by ascertaining the types of material which will be required and by making arrangements for the consolidation of forces in order to take charge of big contracts. In his opinion, Europe would not be a permanent field for Canadian manufactured exports, basing his opinion on the fact that advanced tariff schedules would come into operation which would not be advantageous to Canada. He therefore looked to other parts of the world as offering more attractive permanent fields for Canadian manufactured goods. In this classification he would include Asia, Africa and South America. Let Canadian firms go after this business as fast as shipping readjustment would permit; it would be a strong basis for a permanent trade. By getting in when there was great need and selling honest goods at an honest price Canada could establish a reputation which would stand her in good stead when competition again became keen. Her increased production would cheapen the output to the point where she could meet the manufacturers of other countries with a more or less even chance. While Canada was handicapped in respect to high cost of labor and climatic conditions, she was in a splendid position as regards the supply of certain essential raw materials, in immense power developments, in a strong aggressive population, and the advantage of a climate that kept the vitality of the people at a high pitch.

In addressing the Montreal Electrical Luncheon on January 22nd, on "Drafts for the Front," Major Geo. G. Mitchell described the work of transporting troops between England and France, particularly in relation to the drafts sent across from time to time to keep up the strength in the front line trenches. The speaker gave particulars of the activities following upon orders from the front to send a large draft to some unit in France. He stated that the closest examination possible was made of the men who composed the draft. It was true that the red tape involved much work, but it was necessary to produce a fit soldier for the front line. Major Mitchell also described the send-off given soldiers embarking at Southampton, and their arrival at the base, and later the front line.

"National Research" was the subject of a talk by Mr. W. B. Campbell, at the Montreal Electrical Luncheon, on January 29. After pointing out how the world had benefited from scientific and industrial research, Mr. Campbell remarked that the three essentials for efficient research work was a good library, apparatus, and suitable men. He urged in favor of a central laboratory, instead of a number of small units.

To establish this all the existing government laboratories should be combined into one large laboratory. This had been suggested before now, but the suggestion had met with opposition from the departments concerned. The opposition was based chiefly on the rather intense jealousy which existed between some of the departments, particularly those whose work was liable to overlap. They reasoned that, if all laboratories were combined, the work of some would be credited to others, and that there would be a danger of more money being granted for some work than was given for other equally important work. This difficulty would be avoided if the decision as to the extent of any investigation, and the money expended for it, be left, as at present, under the supervision of the departments concerned. Each government branch or department which felt that research should be conducted on some subject under its jurisdiction, would allot a suitable sum for the work. This would be expended by the laboratory to the best advantage, and the results would be the property of the department or branch to be used as they saw fit. Progress reports would go to the department at frequent intervals, so that it might keep in touch with the work. The personnel employed would be under the sole supervision of the laboratory, and would to this extent be removed from political patronage.

Major Ward, a Canadian who lived in England for ten years, and who described himself as a parson in disguise, was the speaker at the Montreal Electrical Luncheon, on February 5. In a talk full of racy incidents, he pictured the life of a Tommy from the time of his enlistment until he reached the front. The discomforts, to use a very mild term, of the trenches—sewers, Major Ward called many of them—were described; the necessity which compelled men to sleep in water soaked clothes and under very exacting conditions, and how men had to shave with tea and even with soup, was graphically pictured by the speaker. The ordinary Tommy, he said, practically lost all sense of responsibility; and many of the wounded men, who had all possible hospitality lavished on them in England, were apt to contrast their treatment in Canada, where they, of course, drifted back to their homes, although much was being done for returned men in this country.

Major Ward made a forceful appeal for consideration for returned men, many of whom had not yet regained their normal condition. Their services at the front deserved forbearance on the part of those who had not shared in the fighting, and he asked for patience in dealing with the men.

Turning aside for an evening from the perplexities of the electrical industry, the members of the Montreal Electrical Luncheon and their friends held high festival at a smoking concert at the Windsor Hotel on February 6. The Ladies Ordinary was filled to overflowing, and a right merry time was enjoyed. Mr. W. H. Winter presided. The programme was arranged by the entertainment committee—Messrs. Dwight Smith (chairman), J. W. Pilcher, and E. Sayer. It was full of good things, one of the items which appealed to the audience being the boxing bouts arranged by Billy Armstrong, who also staged a very farcical exhibition of the noble art. In the interval there was abundance of refreshments. The whole proceedings were naturally of the free and easy description, and a fine entertainment concluded about midnight. During the evening Mr. Winter announced that the average attendance at the luncheons was increasing, and had gone up from 56 in 1917 to 58 in 1918, and to 61 during the present season.

The following is the programme:—First spasm, pipes and drums, Sgt. McKinnon and Sgt. Gordie Davis, 42nd Batt.; patriotic song, Mr. Jas. Poole; selection from Dr. Drummond's Poems, Mr. Turner; comic song, Mr. Bert Mason; tenor solo, Mr. T. Bissett; monologue, Witty Warren. Second spasm, drum solo, Sgt. Gordie Davis, 42nd Batt.; 3 round boxing bouts, members of M.A.A.A.; Scotch ballads, Mr. James Poole; monologue, Trooper Brown; cello, solo "Priere," Sgt. Denton; songs of the day, Mr. Bert Mason; funny sayings, Witty Warren; recitation, Mr. Turner.

Toronto Section A.I.E.E. Discuss Manufacture of Porcelain

It is possible that Omar Khayyam, in the market place, as he "watched the potter thumbing his wet clay," received some insight into the manufacture of porcelain, but he would have obtained a better working knowledge of the subject if he had lived long enough to hear the paper which was read by Mr. Hugo J. Lundgren of Peterboro to the Toronto section of the A. I. E. E. last week. Not only did the author treat of the electrical applications of the material, but he gave a summary of the development of porcelain manufacture in general. In the great scheme of the universe it was not intended that Canada should be an insulator manufacturing country, for the great glacial slides carried all sedimentary deposits, including the valuable china clay, down into the States. However the glaciers failed to clean out a rock pocket in the Province of Quebec which is now the chief source of the mineral in the Dominion. The other ingredient of electrical porcelain, namely, feldspar, is very abundant in Canada.

Both the wet and the dry process are employed for making insulator porcelain, but the former is most in use for high tension material. Elements for suspension insulators and similar parts required in quantity are moulded in steel dies in a press with special precautions to prevent the clay sticking to the mould. A few years ago a record was achieved by an insulator which took a puncture test of 15,000 volts, the insulator being one of the same size and shape as that used on telegraph lines. To-day, twenty-five years later, with the same raw materials a porcelain is made which will stand a test of 15,000 volts per millimetre. Above seven mm. the dielectric strength becomes less. A greater proportion of feldspar will increase the dielectric stress, but usually at the expense of the physical properties. Under ideal loading conditions the compressive strength might be taken at 8,000 lbs. per sq. in. and the tensile strength 24,000 lbs. per sq. in., but such conditions are very difficult to realize in practice. Insulators are largely subject to unbalanced strains which makes their virtual strength much lower than tests would indicate. The hardness of electrical porcelain is 7 on Mohi's scale and its specific gravity about 2.4.

Annual Meeting of the J.C.T.O.

The annual meeting of the Joint Committee of Technical Organizations will be held on March 24. The place of meeting will probably be the Chemistry and Mining Building of the University of Toronto, but a definite statement will be made later. It is announced that the addresses this year will be given over almost entirely to a discussion of various phases of the labor situation as it affects the electrical industry.

Ontario Municipal Electrical Engineers Celebrate their First Anniversary

A Vigorous Organization of Keen, Aggressive Men

The Association of Municipal Electrical Engineers of Ontario, which celebrated its first anniversary, in Toronto, on January 30-31, has all the earmarks of a thriving organization. There were some 120 members present, all of them enthusiastic, and the discussions were characterized by unusual "pep" and unanimity. The association was particularly fortunate in having Mr. W. L. Goodwin present and in hearing from his own lips the explanation of the "Goodwin Plan" for the improvement of the electrical industry, and it seemed that the municipal engineers of Ontario were won over to the co-operative idea, illustrated in the analogy of the Wheatstone Bridge, just as whole-heartedly as have other electrical organizations all over the continent.

The first session of the convention was held on Thursday morning, in the Chemistry and Mining building of the University of Toronto, the president, Mr. E. V. Buchanan, of London, in the chair. In his presidential address, Mr. Buchanan said in part:

This is the first anniversary of the A.M.E.E. of Ontario and we have every reason to celebrate. Everyone grants that the convention at Niagara Falls was a success, and this meeting gives every indication of being equally successful. I am very optimistic. I have visions of every city in Canada having a municipal electric plant in the near future and then there will be an organization extending from coast to coast. It is natural that on an anniversary or at the beginning of a new year one should look into the future and make resolutions. Our resolutions should be based on the ideal we have gained in the war and which we must apply to the reconstruction period. The war has taught the least discerning what may be accomplished when all elements work together for common good. The individual members of the association should keep before their eyes the good of the association; the association should work for the good of the province and the dominion, by the development of electrical science. What science in this present day can do more for national prosperity? Electricity is the greatest factor in commercial prosperity, but it is also one of the greatest factors for human contentment, without which commercial prosperity is worthless.

In the next year or two a greatly increased power supply will be available. It is our duty to find a market for this power, and here again let me give expression to my optimism, by telling you that it is an easy task we have, although, like any other task it may be done well or badly. It is just as imperative that we should do our bit now as in wartime.

Hydro assuredly had its war burdens, but no observer can escape the conclusion that it has gained more public recognition of its service potentiality than would have been possible in a decade of normal conditions. The people will not forget the great importance of Hydro to our communities and to the Dominion. It seems therefore that we have gained a good deal out of the circumstances of the war, even if temporarily the burdens were heavy.

With these few abstract observations in mind I would call your attention to the programme submitted by the papers committee. Merchandising policies are featured prominently, as naturally they should be at a time such as the present; better methods of construction are given consideration in the discussion of bare and covered wire for distribution, while the technical is not forgotten as an interesting talk and demonstration on the oscillograph is to be provided.

The secretary then read a letter from Mr. W. B. Johnson, of the Montreal Light, Heat and Power Co., regretting that he was unable to be present to give personal attention to his paper and suggesting that Mr. E. H. Porte, manager, Renfrew Electric Co., act in his stead. Mr. Porte kindly consenting, the president announced the subject of Mr. Johnson's paper as "The Advisability of Electric Companies Handling Appliances and Supplies and Maintaining Standard Prices as established by the Manufacturers."

Mr. Oswald F. Scott, the new President, Belleville

P. B. Yates, St. Catharines, Vice-president Niagara District

S. R. A. Clement, Toronto, re-elected Secretary

The Advisability of Electric Companies Handling Appliances and Supplies and Maintaining Standard Prices as Established by the Manufacturers

By W. J. Johnson*

"The Public be Damned" policy assumed by so many of our public utilities a few years ago has now been changed to a "The Public be Pleased" policy and it is well that they saw the wisdom of this change for there are very few companies that, had they still continued with their old methods would be operating to-day.

Until about fourteen or fifteen years ago, electric companies had been content to take such business as came into their office but made no systematic nor special effort to secure any additional business. It was also considered, at that time, that when you had once established your service to the premises, that there was nothing further to be done but render the monthly bills and to see that same was paid. It was also considered undignified for an electric company to send out representatives to secure additional business and to endeavor to increase the consumption of a consumer by showing him where and how he would benefit by using more of our service.

Since the universal adoption of the present high efficiency lamps, how many plants are there that would be earning their bond interest to-day if the standard of illumination had not been more than trebled and the use of current consuming devices so universally approved by the public.

Up to the time that electric companies started to handle appliances there were very few on the market and also very few manufacturers. There is no question but that the appliance business would never have amounted to very much if the central stations had not taken hold and pushed the sales.

At first most companies used to sell irons, which was the principal appliance sold, at the actual cost of the iron, without allowing anything for overhead or selling expenses and generally the cost of selling the iron would amount to as much as, or more than was received for it.

Some companies used to buy irons by the thousands which they would give to their customers absolutely free of cost, provided they were used on the company's service.

These methods of getting appliances in use on their lines, were no doubt effective at that time, but there have been great changes since then. At that time they used to figure than an iron meant a revenue of $1.00 per month, and I guess you will all agree that if under our present rates, we could secure such a revenue from each iron, that we would gladly see that each of our customers had one, and that same was kept in good repair. At our present rates we are very thankful to obtain a revenue of 50c. per month from each iron sold.

It is pretty hard to state what the actual revenue from different appliances amounts to, as conditions vary so greatly, and while it is not very much from anyone, still it amounts to a fair sum for the total number in use.

Appliance Revenue is Net Profit.

With most companies the revenue for current used by small electric appliances is practically **net profit** for your service is established, and your investment is not increased.

You will also very often find that the desire for some appliance is responsible for the installation of wiring and fixtures for lighting.

I have never yet heard of a central station selling appliances just for the profit in the sale—but rather for the revenue to be derived from the use of that applinace. If this be so, then, it is up to use to get all the appliances in use that we possibly can, providing the cost is in proportion to benefits to be derived.

How many of you managers and engineers can say that you have in your own home all the different current consuming appliances that can be profitably used? If you who know all about these appliances have not been convinced of their desirability, then think how much more difficult it will be to convince a person who does not know anything about them.

How can you expect an electrical contractor, hardware merchant, or departmental store to take the time or to spend the money to educate the public to the use of appliances as long as they are only interested in the profit from the first sale?

How many manufacturers are there to-day that depend upon some other organization or person for the sale of their goods unless they have some guarantee as to sales? You often hear of manufacturers who have previously sold their output through special selling agents and who have given up that method and are looking after the sales with their own employees—whether through jobbers or retailers.

As soon as business conditions become normal, you will find that a number of manufacturers of other lines will open retail branches in the larger cities, not with the idea of taking the sales away from the present merchants, but with the idea of increasing their sales in that locality.

I firmly believe that should electric companies discontinue the development and sales of appliances, that not only would the sales of such appliances greatly decrease, but that gradually the use of such appliances as are now in general use, would be discontinued.

I do not mean this as any reflection on the selling ability of electrical contractors or other merchants, but is due to the fact that they would not have the interest in the sales that a central station does.

If you will investigate you will find there are a very much greater number of appliances in use in the cities in which the electric companies promote and push the sale of appliances than where the sale is left entirely to dealers.

Public Has Confidence in Central Station.

The public expects the electric company to not only handle all the latest appliances, but to handle the best and at a fair price. Should they discontinue the sale of appliances, the market would be flooded by the unreliable "fly by night" merchants with cheap worthless and very unsatisfactory goods. This you know would hurt our business, the selling of electric current, more than one would think and would also kill the sales of reliable dealers.

Does the sale of appliances by central stations affect the sales of reliable dealers? Absolutely not, provided they both maintain standard resale prices which without a doubt all should do.

Where central stations push the sale of appliances it means increased sales of all dealers. Every appliance sold, provided it gives satisfactory service, helps sell other appliances.

The question of central stations maintaining standard resale prices on appliances has been discussed for many years until to-day you will find very few who will advocate any other policy. We must bear in mind that the price, as long as it is reasonable, does not sell nor hinder the sale of appliances.

The contractor-dealer cannot continue in business very long unless he can make a profit on the goods he sells, so that if you cut prices, you are forcing him to the wall or to get out of that part of his business.

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* Manager, New Business Department, Montreal Light, Heat and Power Consolidation.

Now place yourself in his position and how would you feel toward central stations? You certainly would not feel like getting out and boosting for them.

The merchant who makes a fair profit on appliances sold is going to boost and recommend them to all his customers, and if he succeeds in closing the sale will make a little profit, whereas you will make a profit every month that it is in use on your lines.

You operators of municipal plants as well as we, need all the friends and boosters that we can get, and such friends can do more harm or good than one would suppose.

If we cut prices it means that the other merchants must discontinue selling appliances and that we would, therefore, sell more, but that does not mean that we would have any more in service on our lines.

By maintaining prices we have that many more salesmen working for the company without being on our payrolls.

At the present rates for electricity what company can afford to sell goods at less than cost, for if your rates are so high that you can, then you are not playing fair with the public, and are charging some of your customers more than you rightfully should.

The question arises as to what is a fair resale price—for I must admit I do not consider some of the prices established by the manufacturer as being fair to the smaller retailer. I believe that resale prices should be based on the average costs of contractor-dealers, plus a fair margin of profit which would no doubt be higher than if based on the costs of a public utility.

Every cent of net profits derived from the sales of appliances, together with such additional amount as your directors will permit, should be spent in educational, sales, and good-will advertising.

There are cities to-day that sell two or three times the amount of appliances per person than other cities do, but the time is coming when the sales in even these cities will amount to treble what they are to-day. That day will be when the public is fully informed and convinced of the advantages of electrical appliances.

The manufacturers are doing a great deal to spread this information, and it is up to us to look at the matter squarely, and consider whether we are doing our fair share. We must bear in mind that the manufacturer makes only the profit from the sale, whereas we make the profit from the sale and also obtain revenue for current used by that appliance as long as it is on our lines. You benefit both directly and indirectly by every piece of advertising that you put out and every contractor-dealer and appliance manufacturer also profits by it.

Should Adopt the Goodwin Plan.

I do not believe there is any question but that it will be greatly to the benefit of central stations when the plan or platform drawn up by Mr. W. L. Goodwin, is adopted by all the electrical interests.

Far more can be done towards educating the public by all the electrical interests working together than by working singly.

The selling of appliances is a merchandising proposition, and the sooner we adopt the methods of some of our best and greatest merchants the better it will be for us.

Hardware dealers and druggists have lately started to handle appliances and the only reason they have made the success they have, is due to the fact that they understand merchandising. Central stations should make a serious study of this subject and we in turn should give the contractor-dealer the benefit of our knowledge.

They, as a rule, are not very good merchandisers, but I am glad to say that there are some who have seen wherein they would profit by same and are now leading the central stations.

Trade papers have taken up this subject lately, and should be commended for the very good work they are doing. We should not only read and study these papers, but should see that our employees are given the opportunity.

I am sorry that I cannot give you any interesting figures as to appliance sales for the reason that we are a combination company.

I will state, however, that we have four branch salesrooms or offices which are absolutely self-sustaining, that is, the profits from the sales of appliances (gas and electric) more than pays all the expenses of the branches. We obtain no credit for current consumed by appliances sold.

We believe in having as nice branches as the locality will permit, but things can be overdone, and a place fitted up so grand that it will not do you the good that a less pretentious one would.

There is no question but that a neat, well arranged office will help your sales a great deal, provided same is properly managed.

The question of central stations handling neutral or allied lines has been discussed for the past year or so, and I believe, that it would be well for all to look into the matter. Personally, I am a firm believer in same, but it might not be advisable to adopt it in some cities.

With central stations it should not be a question of handling appliances and at resale prices, but rather the best merchandising methods to pursue.

Discussion on Mr. Johnson's Paper

Following the reading of Mr. Johnson's paper, the chairman pointed out that they were fortunate in having Mr. W. L. Goodwin present and called on him to lead the discussion.

Mr Goodwin said that, in general, he thoroughly agreed with the points brought out in the paper, taking it for granted that the author believed in sound merchandising methods. There was no question but that all central stations ought to enter into this field, because it was unlimited. The main consideration was whether they go into it for profit or merely to put somebody else out of it by price-cutting methods. Under present conditions it was impossible for jobbers and dealers to make much profit because manufacturers did not leave a sufficient margin. It seemed to him that the utility company—whether publicly or privately owned—might pay for advertising of electrical appliances which would benefit dealers in general, since the utility derived revenue from the current consumed.

As illustrating the possibilities of development in the field of electrical merchandising, he pointed out that though the electrical dealers in the United States had been on the job fifteen years, they had only reached 5 per cent. of the population. There was $100,000,000 worth of electrical goods sold annually, while it has been estimated that there is a possible trade of $500,000,000 to $800,000,000 per annum. It was therefore not a question of whether or not central stations should sell electrical merchandise, but **how** they should sell them. The central stations were in the business primarily to furnish energy, but he would like to see them open up stores that would be attractive and run on lines that would benefit the whole business.

In regard to the writer's statement that he had never heard of any central station entering into the business merely for the purpose of making profit, Mr. Goodwin said that he knew of several in the United States that had gone into it strictly as a business proposition and a separate enterprize.

He also disagreed with Mr. Johnson's statement that manufacturers should open up retail stores in various centres. Mr. Goodwin pointed out that production and retailing are entirely different undertakings, requiring entirely different organizations and that the small local man in a community is invariably in a better strategic position than is the manufacturer operating over a wide area. They had been struggling with this problem in the States, and the manufacturers had decided against invading the field of retailing.

The real point at issue, he considered, was whether central stations would go into the business on the same basis as the dealers. Personally, he would rather see them keep out of the field altogether than to go into it with the idea of monopolizing it by price cutting methods, but he would like to see them conduct retail stores along proper lines that would benefit the whole industry.

Mr. Perry, of Windsor, pointed out that the primary object of any central station was to sell current, and appliances were placed on the market partly for the purpose of increasing the sale of current. He then cited the experience of the local Hydro department at Windsor, in the retail section of their business. In 1915 the merchandise sales had been $11,050; in 1916, $24,931; in 1917, $44,793; in 1918, $66,243. The number of the various appliances sold was as follows:

	1916	1917	1918
Lamps	27,833	34,268	29.111
Irons	989	908	1,491
Toasters	164	234	301
Grills	64	109	104
Percolators	21	40	36
Warming pads	14	8	13
Vacuum cleaners	67	78	79
Washers	16	44	43
Ranges	68	87	95
Fans	132	204	152
Heaters	51	261	253
Hotplates	16	56	66
Motors, single phase	12	11	10
Motors, three phase	9	16	26

In spite of this increasing business on the part of the Hydro store, Mr. Perry said the local dealers were doing a bigger business than ever before, and their mutual relations were very friendly. He was therefore strongly of the opinion that the central stations should get in on the game.

Mr. Madden, Ontario Hydro Commission, thought the paper very timely. He had just recently read that 64 per cent. of the appliance sales in the United States were made by the central station, and it seemed that the advisability of their going into the retail business was pretty clearly established by the action of the principal public utility companies. Most of the towns which had tried it were making a success of the undertaking. Once the construction stage is over, the question of building up a load comes up, and if the central station did not go into the business there would frequently be a long time to wait for results. In the case of ranges, for instance, the central stations had pushed this line in a way not possible to the small dealers. He thought they were coming to the point where central stations in general would go into the retailing business. Advertising, too, he considered was vital, and it was for the local Hydro departments to take the lead in seeing that proper advertising was done.

Mr. Sifton, of Hamilton, suggested that a resolution in favor of retailing by the central stations should be passed by the meeting and sent to the various local Hydro commissions along with a copy of Mr. Johnson's paper. There were frequently prejudices on the part of some of the commissioners, and if a resolution was passed by the municipal electrical engineers as a body it should carry some weight.

Mr. Sifton disagreed with the statement that the investment was not increased by the sale of appliances. In Hamilton they had made a canvass of the larger electrical stores, covering about 14, and had found that from December 1, 1917, to December 1, 1918, at least 3,200 appliances had been sold using over 500 watts. That meant something on the curtailed load, and necessitated increased investment. They had made more transformer changes this year than in any year previously because of certain districts getting in new appliances, while there had been no additional charge for such services. The speaker also mentioned the question of old houses in which electric wiring had not been installed. There were a number of such houses in Hamilton and the wiring would be quite expensive since no provision had been made for such improvement. Most of them were rented, and neither the landlord nor the tenant would make the expenditure. He wondered if something could not be done to remedy this condition and if an arrangement could not be made to wire these houses at reasonable cost. Mr. Sifton's motion regarding the sending of copies of resolution in favor of central station retailing and Mr. Johnson's paper to the local Hydro com-

Mr. R. H. Martindale, Sudbury.
Vice-president Northern District

Mr. H. H. Couzens, Chairman Papers
Committee

Mr. E. J. Stapleton, Collingwood,
Vice-president Georgian Bay District

missions was supported by Mr. Myers, of Stratford, and carried.

Mr. Couzens, Toronto, pointed out that the difficulty seemed to be that in municipalities where they did not sell appliances it was thought that by doing so they would put the contractor-dealers out of business. He did not know of any case where a Hydro store run on proper lines had caused any disadvantage to the dealers, and in his opinion, an appliance department was highly desirable. In Toronto the power shortage had caused difficulty, and the sale of ranges had not been pushed in the local Hydro store, but the sale of other appliances had increased and the department was on a self-supporting basis.

Mr. R. C. McCollum, Toronto, Re-elected Treasurer

Regarding the wiring of old houses, Mr. Couzens said that a number of schemes—free and assisted—had been tried in various cities and towns elsewhere, with little success. He thought, however, that in Canada, where everybody so fully realized the great advantage of electric service, the landlords would really be forced to make the installations. He also suggested that in certain districts it might be a good idea to supply landlords whose houses had electric service with a little illuminated sign, "This house electrically wired." Mr. Couzens drew attention to the fact that this paper had been written by Mr. Johnson, of the Montreal Light, Heat and Power Co., a private corporation, for presentation before the Municipal Engineers Association, which he considered pretty good testimony that their association was not a political one, and that the ideal of all electrical men getting together on a common ground was by no means an impossibility. One reason, he thought, why the contractor-dealers had been considered as antagonistic competitors was because they had not got together sufficiently. In Toronto they had done so with splendid results. If the contractor-dealer was willing to do business along proper lines, he should be encouraged and helped, but if he persisted in doing business upon a wrong basis, it was a matter of education and this was up to the central station.

At this point it was suggested that Mr. Sifton's resolution be amended to provide that a copy of the discussion be sent along with the copy of the resolution and Mr. Johnson's paper to the various Hydro commissions, and it was decided to do so.

Mr. K. A. McIntyre, president of the Ontario Association of Electrical Contractor-Dealers, said that he thought what Mr. Couzens had said was exactly right. He was sure they could increase business by co-operation and no club was needed. The contractor-dealers had no club, but they were seeking a basis of co-operation, permitting of consultation and discussion, and the sooner this was brought about, the sooner would the electrical men in Ontario achieve their ambitions for the development of the industry.

Mr. Archibald, of Woodstock, said that in that city they had not sold appliances to any great extent, only irons and toasters. One reason for this was the location of their office, which was bad for retail business, and they had considered the city too small for the establishment of a Hydro shop. Also there had been considerable objection raised to such a step, by the local dealers.

Mr. Fisk, of Peterboro, said that he was not opposed to the handling of appliances, but their office was on a side street, and there were three live contractor-dealers who pushed the business.

Mr. White, of Dundas, made reference to the resale price of appliances. Often the manufacturer attached a resale price, while the Hydro Commission assumed the authority of fixing the prices of all appliances sold by the local utility. There were hardware stores selling appliances, whose proprietors thought they were ill-used on this account.

Mr. Madden suggested that Mr. Goodwin's paper to be presented at the morning session would cover the question raised by Mr. White. He was anxious to be informed, however, as to the size of a town which could support a Hydro shop.

Mr. Shearer, of Smith Falls, said that the local department in his town had dispensed nearly $4,000 worth of appliances the previous year. The local dealers who handled electrical appliances were well satisfied, however, and the department was doing nearly all the advertising of electrical appliances. At times they had mentioned the names of the dealers handling appliances.

Mr. V. S. McIntyre, Kitchener, Chairman Conventions Committee

Mr. Dusenberry, Hughes Electric Co., referring to the development of the electric range business, said that undoubtedly up to the present time the central station was the source of development in that line. The contractor-dealers, except in a very few cases, were unable to take it up on the same scale and push it. His firm did not make any distinction between the central station and the dealer.

Mr. McIntyre said that the reason the contractor-dealer did not push the sale of electric ranges was because the manufacturers only allowed about a 15 per cent. margin, which was not sufficient to give him a fair profit.

Mr. Rutland, of the Moffat Stove Co., answering Mr. McIntyre's statements, declared that for two years he had tried to sell electric ranges to the dealers and had not been successful. His firm found the central station the logical medium for the distribution of their ranges. There were simple troubles which arose in connection with the ranges, which, he said, the contractor-dealer was frequently unable to make right, while the central station always had men who had the necessary knowledge.

Mr. McIntyre said he was not criticizing the central stations for taking up and pushing the range business, but he thought the previous speaker must have made a mistake in judgment in the contractor-dealers he dealt with. Every contractor-dealer, he declared, had contact with hundreds, or thousands, of homes. Why then was he not the logical man to develop the range business?

It was here suggested by Mr. Buchanan that copies of Mr. Johnson's paper and the discussion be sent also to the contractor-dealers, and this was decided upon.

A motion was also passed that the thanks of the convention be conveyed to Mr. Johnson for his paper and that he be sent a copy of the discussion.

Bare vs. Weatherproof Covered Wires for Potentials Above 750 Volts

By Mr. A. S. L. Barnes*

The object of this paper is to bring before you an oft-debated question of considerable importance to those interested in overhead distribution work.

Some time ago the Chief Engineer of the Hydro Electric Power Commission of Ontario appointed a Committee on Rules and Regulations for Outside Overhead work, consisting of members of the engineering staff, and this subject was discussed on a number of occasions by that Committee, but without any final decision being reached, as there were warm advocates of each side of the question.

The Chief Engineer of the Commission was desirous that this matter should be brought before this Association and your Committee considered it well worthy of serious attention.

In the preparation of this paper, the object kept in mind has been to invite discussion of the subject of it rather than the paper itself and it has therefore been my endeavor to marshal a few facts, together with the statements of various authorities regarding this question, in such a manner as to fix in your minds some concrete ideas out of which useful discussion may arise; if this results, the paper will have fulfilled its purpose and the intentional omission of many personal expressions of opinion will have been justified.

The N. E. L. A. Handbook on Overhead Line Construction, dated 1914, contains the following under the heading of "Weatherproof Insulation":

"A trade name for a character of insulation consisting of one or more layers of braided material, soaked in an insulating compound."

In another part of the book we find this:

"In the manufacture of triple braided weatherproof wire, the wires are covered by three closely and evenly woven braids of a strong fibrous material after which they are placed in a hot bath of weatherproof insulating compound."

The Standard Handbook for Electrical Engineers, 1915 Edition, says:

"The so-called weatherproof insulation becomes a reasonably good conductor when moist. Triple braid weatherproof conductors have three braids saturated with a so-called weatherproof compound, served around them. . . . . Triple braid weatherproof conductors are approved by the National Electrical Code for outside construction, but double braid conductors are not approved at all."

The National Electrical Code, 1918 Edition, states:

"This wire is for use outdoors, where moisture is certain and where fireproof qualities are not necessary. The insulating covering shall consist of at least three braids, all of which must be thoroughly saturated with a dense moisture-proof compound."

One thing which has struck me rather forcibly about these extracts, is the use of the expression, "weather proof insulation," which is very commonly employed.

No one pretends for a moment that weather-proof covering is insulation, at least not for voltages from 2,200 upwards, so why call it by such a name?

The word "insulation" in connection with weather-proofing is a mis-nomer and I would suggest that "weather-proof covering" be used instead. The public, and particularly the legal profession, are seriously misled by the use of an expression for which no justification is to be found.

I observe also that while the National Electrical Code specifies the use of triple braid, it is common practice apparently, in Canada, to use only double braid, indicating a difference of opinion as to the degree of "insulation" for which it is worth while to pay. The balance between safety and its cost is evidently not thoroughly established.

There are many conflicting ideas on the question as to whether the use of weather-proof covering should be continued or abandoned, for potentials above 750 volts, and it is believed that the following views expressed by various authorities will prove interesting here.

In the N. E. L. A. Bulletin for September, 1916, Mr. G. S. Humphrey, speaking of primary conductors, says:

"As to whether wires shall be bare or insulated, we have been specifying that insulated wires shall be used only in Salt Lake, Ogden, Prora and Logan; bare wires being used in all other places unless insulated wire is prescribed by some local ordinance. We don't believe there is any real protection afforded by the standard weather-proof insulation, at least, if there is, it is only for a comparatively short time while a false sense of security because of the insulation may cause injury to someone. An insulated wire is more apt to be broken by the wind or sleet than the same size bare wire, and it cannot be held in place so well. The bare wire is, of course, much cheaper than the insulated, both because of the saving of the cost of insulation and also because of the saving in cost of poles and fittings, since longer spans may be used with the bare wire. The advantages of the insulated wires are that interruptions due to crossed wires may be slightly reduced."

In the N. E. L. A. Bulletin for November, 1916, in an article by Mr. A. S. Hall, occurs the following, which has reference particularly to rural lines:

"The insulated copper which has in the past been regarded as proper for city uses is entirely out of place in rural construction. It shortens the span, thereby increasing support cost and the insulation does not add any great factor of safety in the rural [illegible]

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* Assistant Engineer, Hydro-Electric Power Commission of Ontario.

A Plea for Better Insulation.

Below is an extract from the Electrical World of January [illegible], taken from a report of a paper read before the Western Association of Electrical Inspectors on "Whether [illegible] Volt Primaries should be run without insulation on the conductor itself":

"Mr. McGann has conducted at the electrical laboratories of the city of Chicago a number of tests on various samples of weather-proof wire to determine the effectiveness of the insulation as a dielectric after different periods of use. These tests were made on dry and immersed samples, new and in service for three, five and ten years. While new wire with moisture repellant still in place withstood four times the normal voltage of the lines, wet samples barely withstood the line voltage to ground, but showed a good factor of safety for line crosses where the insulation of two wires is interposed. Samples taken out of lines which had been in service several years, had lost very considerably in dielectric strength dry, but even more wet, and none but the new wire gave an insulation test indicating reliable protection for line men on poles. The tests show that in general even wet insulation may, for 2,300 volts, be depended on for ten years, if the insulation remains intact, to prevent break-down when wires of opposite polarity swing together. Mr. McGann drew the conclusions that present standards of weather-proof insulation give a distinct advantage over uninsulated wires by protecting against primary contacts to secondary, promoting continuity of service and protecting linemen in dry weather or with new insulation. Mr. McGann concluded with an earnest plea for a better insulation for overhead wires, asserting that dearer line construction would be repaid by greater safety to life and apparatus and by continuity of service, and suggested that the overhead wiring committee bring in at its next meeting specifications for such an insulation.

"While not intended as at all exhaustive, this series of tests marks a real advance in the present knowledge of the value of weather-proof insulation for 2,300-volt construction. The question of 6,600-volt construction was not touched on, and at least for present insulation Mr. McGann recommended the use of insulating gloves by linemen working on live 2,300-volt lines."

In 1917 some tests were made by the Hydro Electric Power Commission on double braid weather-proof covering, the results of which are given below:

Comparative Tests on No. 6 B. & S., D. B. Weatherproof M. H. D. Copper Wire

Weight, lbs. per 1,000 feet		Tensile Strength		Insulation Resce. Megohms per mile		Breakdown Voltages		
Bare	Covered	Wire (lbs.)	Lbs. per Sq. in.	Dry	15 hrs. Immersion	New	After Baking	After Boiling
A. 77.06	100.7	740	37,000	23.6	3.85	3,600	2,000	800
B. 78.64	101.8	713	35,500	12.5	2.74	3,000	1,200	800
C. 80.77	103.5	736	36,800	17.75	2.94	1,200	2,600	800
D. 79.25	102.1	722	36,000	*35.5	*3.42	1,200	2,600	800

*Comparative figures only. Not sufficient length of wire used.

These tests were not at all exhaustive, but the records of break-down voltages, it will be seen, are too low for safety and are also erratic, showing that no reliance can be placed on such covering—this, of course, is a well-known fact, but the figures corroborate it.

The following is taken from Bulletin No. 75, Circular of the U. S. Bureau of Standards,—"Safety for the Household."

"In this connection it should be understood by all members of the household that the insulating covering on high voltage wires cannot be depended upon for safety of persons touching them. It is not feasible to maintain reliable insulating covering in swaying overhead wires, such insulating coverings as they do have, serving principally to minimise the probability of short circuits between wires and their consequent breakage when crossed by fallen twigs or by other wires."

Later on, this sentence occurs:

"Insulated overhead wires should be treated the same as bare wires since the insulation quickly becomes defective in outdoor use."

I would like to say here that the use of the word "insulated" in the last quoted sentence appears to be particularly unfortunate as it decidedly gives the impression that the covering when new is a fairly good insulation.

Omission is Often a Safeguard.

Mr. S. B. Hood, whose name is probably well-known to all of you, was reported in the Electrical News some time ago as saying:

"Insulation which is not a protection is a death trap and its omission is both a safeguard and an economy."

Below are quoted successively, letters from various authorities in the United States to whom enquiries have been addressed regarding the subject of this paper:

Letter dated September 19th, 1918.

"Dear Sir:—Referring to your letter of August 21st, addressed to the National Electric Light Association, inquiring as to the views of the Commissioner on the subject of Bare versus Weatherproof Wires for Potentials above 750 Volts,' I will endeavor to give you what I believe to be the consensus of opinion of those who are operating distributing systems throughout the States.

"In the Eastern part of the States, it is very general practice to use weather-proof insulation on all wires erected in the built-up portions of cities. This is done quite generally on voltages up to 13,000 and in some cases on higher voltages. The use of weather-proof insulation on circuits above 7,500 is chiefly a matter of complying with municipal ordinances which are designed primarily to cover the ordinary distributing circuits operating at voltages below 7,500. These ordinances in most cases do not discriminate between distributing and transmission voltages, and weather-proof wire must therefore be used within city limits in order to comply with the law.

"In smaller towns and in the far west, it is not unusual to see bare wire used on distributing circuits up to 7,500 volts.

"In large systems where there is more than one arm on a pole and where it is customary for men to work on the lines alive, the use of bare wire is not considered safe for linemen.

"Weather-proof insulation is not considered as a complete protection to linemen against ordinary distributing voltages under 7,500 volts, but taken in conjunction with the wooden poles is a very material aid in avoiding accidents. Companies operating the larger systems usually have rigid rules requiring joints to be well taped, and permitting no bare connections of any sort on poles where men are required to work. It is customary, however, to use rubber blankets or other protection, as the condition of insulation of various ages is uncertain and cannot be wholly depended upon.

"The presence of weather-proof insulation is of considerable assistance in minimizing damage to communication systems which may become crossed with lines operating at voltages below 7,500 volts, and there are numerous cases on record where crosses of this kind have occurred in which the insulation has protected the communication circuit from damage.

"At voltages above 7,500 the insulation ceases to be a material protection, either to linemen or to communication circuits, and the use of weatherproof insulation, therefore, involves an additional investment which does not appear to have compensating advantages.

"I am not sure whether this is the sort of data which you are seeking in the matter, but from a wide acquaintance with engineers who are operating such circuits and with committees who have assisted in making safety rules affected by this question, I believe that the above is a fair statement of the situation in the States.

Yours very truly,
(Signed) H. B. Gear, Chairman,
Committee on Overhead Lines and
Inductive Interference, N.E.L.A.

Letter dated October 9th, 1918.

"Gentlemen:—Replying to your inquiry of October 3rd, we are unable to advise you at the present time of any city which specifies the use of bare wires for overhead electric lines above 750 volts.

"It is generally conceded, however, that weatherproof covering on such wires deteriorates very rapidly and it is doubtful whether any useful purpose is achieved by requiring such a covering. It is sometimes claimed that hazard is increased where such a covering is used on account of the false sense of security suggested by the presence of insulation which may be inadequate and hence dangerous.

"Since the National Electrical (Fire) Code requires this insulation, it is used by many utilities who do not approve of it merely in order to conform to the rules. It would seem very desirable to obtain wider experience in the use of bare 2,200 volt lines in order to demonstrate the question of relative hazard.

(Signed) S. W. Stratton,
Director Bureau of Standards,
Washington, D. C.

Letter dated October 24th, 1918.

"Dear Sir:—In replying to your inquiry of the 19th, relative to the use of bare wires for overhead distribution circuits above 750 volts, we would offer the following as expressing our opinions covering the various points which you mention.

"Our practice is in favor of bare wire for primary distribution circuits. For voltages 6,600 v. and over, we invariably use bare wire unless local regulations require the wire to be insulated, in which case we endeavor to secure a modification of the regulation. For 4,000 v. and in general, for 2,300 v. we use bare wire where Governmental and local requirements do not conflict. The following opinions have been reached as a matter of judgment from our operating experience in various parts of the country, rather than from compilations or analyses of statistics.

"The slight temporary and generally undependable protection afforded by the covering is usually more than offset by the largely increased wind and ice loadings which the covering occasions. Bare wires are less likely to stretch or break, are steadier in the wind and impose less loads on fastenings and structures. We have heard the statement that sleet forms less readily on bare power wires, but we have no knowledge as to this point.

"On lines with suitably spaced and supported conductors, the tendency to interruption from swinging crosses is so frequent troubles such as broken conductors and crosses and largely decreased as to be more than outweighed by the more stretched conductors, which result from the use of insulation; that is, there is a net gain against interruption by omitting insulation.

"While in a liberal percentage of cases of contact, insulation may afford protection against shock to linemen working on live wires, the presence of insulation creates a false sense of security on the part of the workmen, which tends to carelessness. The only safe rule for linemen is to treat all primary wires as if bare, and this rule will be more effectively observed if the wires actually are bare. When live primary wires are to be worked upon the use of protective devices, such as portable shields, are much more effective protection to linemen than insulation on conductors.

"The use of covered wire is more expensive, owing both to the greater initial cost and to the fact that the wire must be replaced when the covering begins to disintegrate.

"We trust that we have covered this matter in accordance with your desires.

Yours truly,
(Signed) P J. McLelland,
Electric Bond & Share Co., New York.
Chief Engineer."

Conclusions.

So far as I have looked into the question, there seems to be four main points on which opinions differ, and if a suggestion as to procedure be not out of place, I would propose that discussion be centered around these points, preferably in the order given so far as it is possible to treat of them separately.

The four points are:

1. Safety.
2. Operation.
3. Cost.
4. Public opinion.

These main headings may also be sub-divided, in their relation to other factors, as follows:

1. Safety (in erection, operation and maintenance).
To: (a) Power linemen.
(b) Telephone and telegraph linemen.
(c) The public.
2. Operation
Of: (a) Power lines.
(b) Power stations and sub-stations.
(c) Telephone and telegraph systems.
3. Cost
Of: (a) Wire,
(b) Labor,
(c) Operation,
(d) Maintenance.
4. Public opinion.
(a) General Public Opinion.
(b) Opinion in the Law Courts.

At this stage I will leave matters in your hands in the hope that the subject has been so presented that profitable discussion, leading to definite conclusions upon which decisions as to future action can be based, may result.

Discussion on Mr. Barnes' Paper

Following the reading of his paper, Mr. Barnes referred to a table on the blackboard showing relative costs of bare and covered wire. The table is printed below:

	Relative Costs			
	War Prices		Pre-War Prices	
	No. 6	No. 0	No. 6	No. 0
Bare	100	100	100	100
D.B.W.P.	130	128	135	135
T.B.W.P.	145	136	150	148

It was suggested by Mr. Lang, Ontario Hydro, that the matter in a [illegible] regards the use of bare vs. weatherproof covered wires appears to be this: The weatherproof covering [illegible] a large percentage of cost of the wire—between [illegible] and [illegible] per cent., and the question was whether the covering was of sufficient value to justify this extra expense. In one small system recently constructed, the saving by the use of bare wires was about 3 per cent. If this could be saved on the wires, they could put the money into other methods of protection—such as the wider spacing of the wires on the pole arms. Even among linemen there is a difference of opinion. Some said it was of real value and others that it was practically useless.

Mr. Wills Maclachlan, Toronto, thought that the weatherproof covering was of no value at all. It was a case of placing an insecure protection around a grave danger, and the peril to the public was greatly increased, because they were under the impression that the covering constituted a real safeguard. If there was no covering on at all, they would keep clear of exposed wires. Mr. Maclachlan also thought that the linemen were just as safe working with bare wires. They should, of course, be provided with well-tested gloves and mats. There was a great danger in their trusting the weatherproof covering for protection.

Mr. Latimer, Ontario Hydro, was of the opinion that insecure insulation, which is not a protection, was a death-trap. With regard to the letter from R. J. McLelland, quoted by Mr. Barnes, in which it was stated that for voltages of 6,600 and over, the practice was to use bare wires, the speaker said he would favor including 2,300-volt lines under this regulation. The difficulty of swinging wires could be eliminated by greater pin spacing.

Mr. Cook, New Toronto, mentioned an instance of where two horses were killed when a bare wire blew down. After that there was an insulated wire put up, and there had been no further accidents.

Mr. Bell, of Mimico, also believed that the insulation was of benefit, and cited a case in which it had been the means of saving a man from death or very severe injury. He was working with this man on 4,000-volt lines, phasing them out, and had seen his companion come in contact with a line, and only for the weatherproof covering he would undoubtedly have been killed. As it was, he was little the worse.

Mr. Ireland, Ontario Hydro, said that life hazard was the essential point to be considered. If the covering contributed to safety, the cost should not be considered, but if it did not give protection it should be discarded. Personally he did not know of any cases in which men's lives had been saved by the weatherproof covering, and he would not put any dependence on this covering on lines carrying over 600 volts. It was of use, however, in 110 and 220-volt secondaries, which had often to be strung around where clearances were small, and there would be many cases of short-circuits if the wires were bare. On primary and series services, however, he thought the covering should not be used.

Mr. Heeg, Guelph, also thought that primaries would be better without insulation. In the old days when the voltage was 1,100 or 1,240 and the insulation seemed to be better, it might have been of real value. He had recently taken down some wire which had been up for seventeen years and some of it was better than what had just recently been installed. He was in favor of using bare wire for 2,200 volt lines.

Mr. Fisk, Peterboro, considered that the weatherproof covering indicated the fact that the wires were dangerous.

Mr. Coleman, Port Hope, said he did not agree with the many opinions expressed in favor of discarding weatherproof covering. He knew of three instances in which he believed the covering had been the means of saving men's lives, while he also knew of one where a man had been killed through contact with a covered wire. He mentioned a case of a man sitting on 2,200-volt wires when he discovered they were live, but escaped without injury, and another of a man picking up a covered wire from the street without fatal results. He therefore thought that the wire, while not an insulation was some protection.

Mr. James, Ontario Hydro, was of the opinion that the question of covering the wires was more or less sentimental. He did not think there was an engineer in Canada or the United States that would assert it was a protection, but the step was a drastic one and for that reason they hesitated to make the change. He believed it was a false safeguard and that if the wires were bare, workmen would be alive to the danger and would not touch them.

Mr. Sifton, Hamilton, thought no drastic step should be taken, and that it was a question of education. He suggested that in rural districts, bare wires might perhaps be used for 2,200 volts, but where the public and the linemen were accustomed to look for covered wires, it should still be used. He had taken the question up with the linemen and they said they would rather work with the covered wires.

Mr. E. M. Ashworth, Toronto, thought the general public would not stand for the absence of insulation. In his opinion, they required safety and it would be well for the committee to take up the question of obtaining a wire covering that would be safe. The proper course was to try to procure adequate insulation.

Mr. Latimer said that at various inquests he had had to attend, it had been brought home to him that insulation could not be depended upon. Gloves, shields and mats, or grounded surfaces around the poles, he believed was the only method of dealing with the problem.

Mr. Ostrom, Northern Electric Co., declared he was quite willing to admit that the so-called weatherproof insulation might not at all times serve as a protection.

Mr. Wright, Eugene F. Phillips Co., years ago had strongly advocated bare wires, but now he believed that for voltages up to 2,200 volts it was a safeguard. Protection to the public was also a consideration, particularly in the case of damage suits, and legally, he understood, it was required that the lines be insulated. Mr. Wright believed that for every accident reported where weatherproof covering was used, there were several averted.

Mr. Martindale, Sudbury, did not think that drastic action should be taken, and cited instances where accidents had been prevented by the use of the covering.

Mr. Alford, London, said that after 19 years experience, he believed that it was more satisfactory to use the covering, both from the standpoint of cost and public opinion. In the first place, in construction work, covered wires could be strung among other wires without danger. Also, there was not the same danger of wires grounding. And, in the second place, while the covered wire cost more, he believed the difference was more than made up by the fact that linemen could work faster and with a greater degree of safety. Finally, public opinion would be against anything that would appear to be dangerous. He had been working in London for the past twenty years and had yet to have a man go to hospital through coming in contact with a covered wire. As to gloves, one could supply them to linemen, but as soon as his back was turned, they put them in their pockets.

In regard to stringing wires across another company's lines, Mr. Lawlor, Ontario Hydro, pointed out that, if insulation were not used, the poles would, of course, be made high enough to give a safe clearance over the other lines. In London, he said they used ground insulation on everything over 5,000 volts.

Mr. Maclachlan emphasized the necessity of testing rubber gloves and shields. These should be tested monthly to be of any value.

It was then suggested that a committee be appointed, consisting of outside superintendents and managers, particularly men who had a good deal of experience on construction of line work and that they report at the next meeeting. This was decided on, the selection of the committee being left to the chairman. This committee was later announced as follows:

R. H. Martindale, chairman; Messrs. Bell, Mimico; Cook, Niagara Falls; Heeg, Guelph; and Alford, London.

At this point it was announced by Mr. Clement, the secretary that Mr. W. R. Clarke, of Beaverton, one of the members of the association, had passed away. The deceased had fully intended to be present at the convention, but had taken ill rather suddenly and had died on Saturday, January 25. The meeting unanimously resolved that an expression of sympathy be sent to Mrs. Clarke in her bereavement.

The Thursday Evening Dinner

On Thursday evening the delegates met at 6.30 dinner at the Carls-Rite Hotel, where songs, the renewal of old acquaintanceships and good fellowship held sway for an hour and a half. Brief addresses were given by Mr. Goodwin, Mr. Sifton and representatives of the various manufacturing and jobbing member companies. Mr. C. H. Hopper also spoke at some length on the kindly relationship existing between the travelling salesmen and the Hydro managers and engineers. Mr. Hopper said in part:

I am sure that you will be glad to know that I am a firm believer in the brief after dinner talk unless the speaker be one who has a subject of real import and is an authority on that subject, but I have accepted your president's very flattering invitation to talk to you this evening with the idea that just while you are smoking your cigars—and are thus probably lulled into a sense of comfortable tolerance—for I know these Front Street cigars—you would be willing to listen to a salesman who would have you know that the man who follows the Hydro-lines—who travels the Hydro trail—finds in life and in his relations with you something more than orders, something more than that which can be estimated only in dollars and cents. And I feel that the sentiments of my brothers of the trail are in hearty accord.

Hydro means much to the people of this province, it means much to the electrical profession, but to me, and my brothers, it means all that it is to them, with the pleasing addition that it has blazed a trail for us to follow; on which we find friendship as well as business, good fellowship as well as orders. For you seem to realize that we travellers belong to the same human family as yourselves. That the transient, who drops into your office between trains, throws his portfolio on top of his competitor's goods, jollies the stenographer and wants to know if the "big noise" is in, is a man capable of really fine feeling if you draw him out—and he is particularly susceptible to the drawing process, after business hours, of course. He has the same faults that you have, provided he can ascertain just what those faults are, only he has them a little more so. And when the lighting load comes on, he has the same yearnings for companionship, for home and family, only the pain is somewhat dulled by constant denial.

It is then that he thinks of all those little homely details peculiar to his own household. It is then, gentlemen, that the traveller finds life on the road drab and tasteless, especially tasteless, now. And right there is where the men one meets on the Hydro trail seem different from those of any other trail I have travelled. Because each one of us has found among the men he calls on some kindred spirits, some congenial souls, who strike a sympathetic chord and with whom he finds much in common, entirely aside and apart from the buy and sell world. You make us feel we are indeed all members of the great electrical scheme, that we are all moving the same direction, each having his particular part to perform for the good of the whole, none being, in the general sense, independent of the others' effort, each being a lever that moves the other, only sometimes, we have to pry mighty hard.

The traveller is a current flowing across the great electrical ocean. He mingles with the electrical waters from all points of the compass. He knows as probably no other member of the fraternity knows how immaterially few there are who are impelled in their activities by any other than a wholesome and genuine desire to conduct their part of the scheme, to play their part of the game. in a manner that squares with the common rules of good business fellowship.

And now that there are movements afoot with the objective of a complete organization of the electrical family, it seems to me that, right under the surface, there is now an organization—an organization without a practical code of rules as regard details, but based on those principles that find a home in the hearts of all decent fellows, and if, to that organization of proper spirit that now exists, there can be fitted the harness of practical association without disturbing the fine impulses of squareness that naturally flows through our electrical community, the advocates of this movement will find the work already complete in all but the placing of the keystone.

Square D Co. Open New York Office

The Square D Company, Detroit, manufacturers of Square D Switches, opened a new Metropolitan Office at 149 Broadway, on January 1st. J. A. Jaques, district sales manager, has been placed in charge of the office. Mr. Jaques was formerly connected with the Pittsburg office of the Square D Company. At one time he was a member of the sales organization of the Western Electric Company. Mr. Jaques will represent Square D interests throughout the Metropolitan district.

Increase in Southern Canada Power Receipts

For the three months ending December last the gross receipts of the Southern Canada Power Co. at $144,648, showed an increase of $32,053, and net at $66,455, an increase of $16,664. The water power development at Drummondville is progressing satisfactorily. The plant will have an ultimate capacity of 18,000 horse power, and it is expected that equipment for 7,000 horse power will be installed and in operation by May 1st next.

Daylight Saving and the Coal Supply

Canada adopted the daylight saving idea last year, as also did the United States, because of its successful operation in Great Britain, France, Italy, Germany, Austria, Holland, Denmark, Sweden, Norway, Portugal, Australia, and Iceland. The United States Fuel Administration has computed that 1,250,000 tons of coal were saved in the seven months during which the system was operative. This figure was based upon a large collection of data, and also upon definite records for one community of about 1,000,000 population.

Mr. Harry S. Anderson, treasurer of the Masco Company, Limited, Toronto, jobbers of electrical supplies, died recently.

The Goodwin Plan Meets the Approval of the Ontario Municipal Engineers

Mr. W. L. Goodwin, whose famous plan is now known more or less to every electrical man on both sides of the line, was called upon on Friday morning by the chairman to explain his scheme to the municipal electrical engineers of Ontario.

Mr. Goodwin, in opening, pointed out that there were two distinct problems in the electrical industry—one relating to the creation of energy producing stations and the production, distribution and sale of the energy. That problem involved primarily financial and engineering questions. The other was the production of articles for the distribution and consumption of the industry's principal product, energy. In the first case, dealing with a commodity which is known, there would develop a natural monopoly which could best be handled by a single interest. Eventually, being an article of general public use, it would resolve itself into one of public ownership. Perhaps the Province of Ontario was just a little in advance of the rest of the world, but sooner or later the public ownership of all electric light companies is bound to come.

For the present, however, Mr. Goodwin said he was not concerned as to whether the utility company was publicly or privately owned. His problem had to do solely with what he called the manufacturing or merchandizing part of the business and that part of the business cannot become a monoply and can never be publicly owned. It consisted, to a large extent in dealing in "style and habit" goods and depended for development on the whims of the general public, whose ideas vary widely, so they would always be selling articles in competition with each other to meet the varying ideas of the larger mass of the people. In the broad sense the consumers would not be satisfied with the same article, the incandescent lamp being an exception, since it had become a necessity and they were not concerned in its manufacture or style, providing it gave proper light. But in all other products of the industry, such as irons, toasters, fans, grills, etc., there was the scope for individual taste, and each purchaser preferred to make his own selection.

A proper merchandizing policy and good salesmanship were necessary to develop the second part of the industry. Electrical men had experimented with every conceivable policy to get their goods before the public. He had fussed with this problem for twenty-eight years and tried out every policy ever suggested. It should have been plain that many of the plans experimented with were impracticable. They had got to follow the precedent of about 500 years and there was nothing new to be developed. All one had to do to discover the best merchandising methods was to walk down the city streets and see what merchants were doing. In the States, the idea of the early pioneers was selling at cost and bargain sales and these were tried for about ten years. Notwithstanding that some of the utility companies sold at cost and sometimes less, they had never been able to sell in any great volume—first, because the public preferred to make a selection, and, secondly, because no man with one line of goods could hope to please the public. Selling energy is one thing and selling goods another; no central station could possibly reach all of the people.

Monopoly Hampers Trade

There were hundreds and hundreds of houses not wired for electric service but no central station, no matter how aggressive, could ever accomplish very much in the wiring of old houses by cost price and bargain sale methods, for people have different ideas about what they want. In this way anything tending towards a monopoly hampered the trade, whereas if all the factors were developed, manufacturers, jobbers and retailers, different ideas were brought out which appealed to different people.

The greatest results, Mr. Goodwin said, were produced by increasing the number of retail stores and the number of manufacturers producing articles with different selling points. At the Pacific Coast, where he had been in business, they had tried all the different plans in different communities. First they had tried selling the product through the central station as a single unit, the station undertaking to do the wiring. In another community they tried the plan of selling the product and the wiring at less than cost and adding the difference to the cost of the current. Finally they had determined the cost of the energy as one thing and the cost of the goods as another and then created manufacturers, jobbers and retailers to bring the goods to the public, and for ten years they had proved this plan to be the most satisfactory. In other words, this went to prove that the greater the number of points of contact with the public, the greater will be the sale of energy and appliances—bearing in mind all the time that there are two different problems, merchandize and energy.

Mr. W. L. Goodwin

In regard to the sale and distribution of energy, there were wide differences of opinion, and they would probably have to go on experimenting, but in the other problem, merchandizing, they had learned a lesson and reached a standard, and after 500 years experience the path ought to be pretty clearly set, so that there should be no difference of opinion as to the best methods to apply.

Mr. Goodwin pointed out the result of the proper application of these methods on the Pacific Coast, as compared with the chaotic condition of the industry in other parts of the country. East of the Rockies, including the thickly populated districts where climatic and other conditions favored the use of electrical appliances, the per capita sales per annum only amounted to $2.50, as against $30 per capita on the Pacific Coast, where the climatic and living conditions, generally, do not make electrical appliances as necessary to the comfort of the population.

More Electrical Stores of the Better Sort

Mr. Goodwin said he had come to tell them the results of the experiments in the United States. In Canada there was an opportunity for the development of the industry at a far greater rate than the central station could ever take care of. It was not a question of building central stations for the purpose of forcing the public to buy current, but, with proper organization, it would be a question of finding the money to build the necessary central stations. To accomplish the best results, we must provide innumerable means of contact with the public and that means of contact must be high class retail stores operated all over the Dominion. The greater the number and the better the character, the more rapid the development. We must not let unkempt, poorly-managed, electrical shops stand in the way of progress. If one considered conditions in the United States, it was found that 40 different merchandising policies of manufacturers and jobbers had prevented proper retail distribution. Men engage in the retail business for profit, and you can't expect them to take it up unless they have some reasonable assurance of success. With proper retail distribution, innumerable manufacturing concerns would spring up. In the States there were more than 1,900 manufacturers, 300 jobbing concerns, 25,000 specializing in electrical contracting, 75,000 other concerns selling devices and appliances of one kind and other. While they had had a certain amount of direction on the commercial side of the business they had built up powerful organizations representing the four great groups, and these groups had grown without direction, their purpose being to develop their own branch of the industry without regard to the others. The central stations formed their organization primarily for the purpose of strengthening themselves; the manufacturers formed their organization without regard to the problem of retail distribution; the jobbers concerned themselves with wholesaling only; and the contractors, with installation. In twenty-five years these four great organizations had never met together for the purpose of discussing questions of common interest. When they had such a great industry, was it not a mistake to permit it to go ahead without some direction? These four great organizations are formed and then they start to tear themselves to pieces at the expense of the buying public.

The suggestion of getting together for the development of the industry was generally misunderstood by the various groups and by the public alike—first, because the collective bargaining had been carried on behind closed doors. When this policy was followed, it was bound to result in a discussion along selfish and narrow lines. All meetings should be held with open doors and the public taken into confidence, for we could never develop an industry that would stand unless our intentions and motives were beyond suspicion. To bring these groups together for a common purpose, it must first be recognized that in each there are specialized problems. A man selling merchandise is not at all interested in a discussion as to the proper frequency one might use in the development of a new machine. Neither would an engineering association be very much concerned whether the length of an appliance cord was six, eight or ten feet. Therefore a lot of time and money and energy would be wasted if the groups were brought together on all the problems of the industry. A single organization should be built up for the discussion of questions of common interest, but the separate organizations must be maintained for dealing with special problems.

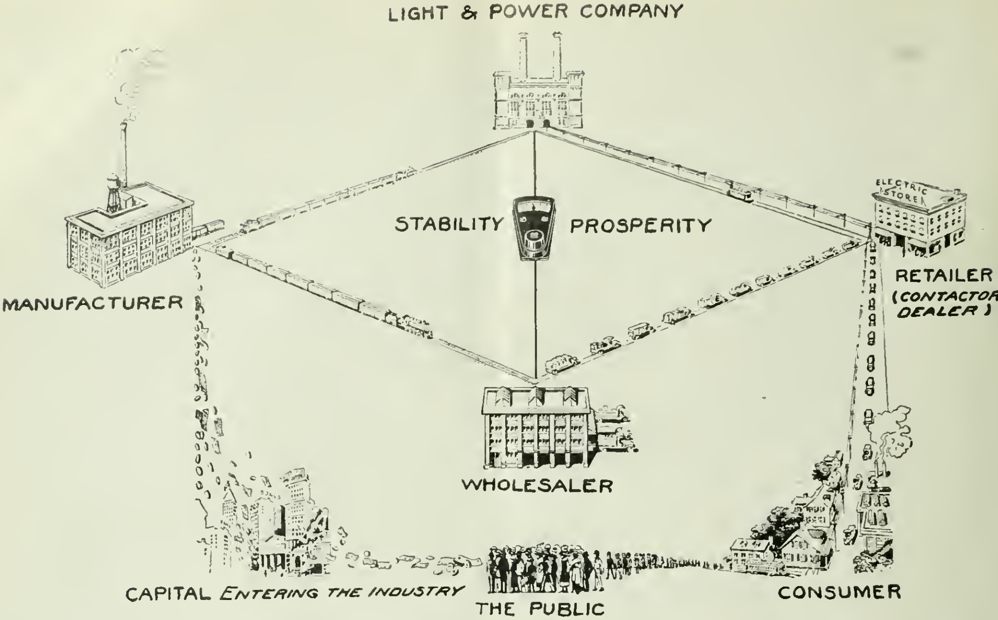
Mr. Goodwin said his idea was to build up the groups and tie them together by executive committees which would only discuss problems of interest to all. In the States they figured they might bring in about five or six hundred thousand members, and by the contribution of 1/40 of one per cent. of all gross sales, two or three or five or six million dollars per annum would be available. They could then form electrical boards of trade in the various towns and cities to discuss problems and seek to provide proper contact with the public by public lectures. It was almost pitiful, the speaker said, to discuss electrical questions with the average housewife. She is totally ignorant in regard to them. For example, the first question one was likely to be asked was: What is this electricity? Of course that could not be answered and as a result uncertainty arises in the public mind. Then, if one began to discuss engineering questions, the budding Edison of the household might ask: Why 50, or why 60 cycles? And again there is no ready answer. Or one might go down the street and find one merchant selling an iron at $6.00, another selling it at $4.00, and another at $3.50. And so, the public loses confidence in electrical things and electrical people. Therefore the men of the industry must get together and come into agreement as to the story they will tell the public, and all tell the same story and all in the same way. They should not talk with the public in regard to technical problems, but only about merchandizing. If they developed electrical boards of trade and organized a lecture bureau, they could have lectures prepared that would appeal to the public and could have these lectures delivered in every town and city in the country. They could also develop lectures within the trade on trade matters, and could talk about them on the same day, on the same subject, bringing all together, so as to arrive at a solution of a problem. But by present methods, the difficulty was that they were talking on different points. If machines in a power house were to do their work efficiently they must be brought into synchronism, and it was just as necessary that the various branches of the trade throughout the country should be brought into synchronism. It was just as easy to do this as to have engineers struggling with the same problems at 50 different periods of the year. All should discuss the problem at one time and decide what was the best thing to do.

However, the industry had grown in spite of errors of judgment. The forces were working to develop it, in spite of our activity or inactivity. But let us centre our activity along the best known lines and then we would get the confidence of the public because the problems had been treated in a scientific way.

Two Different Problems

Regarding the two problems of energy distribution and merchandizing. In the first case, the problem was in the experimental stage, but in the second case, it was not, for the best practices had been proven in other lines of trade. The trouble arose in the States in the early stages because engineers were appointed commercial managers and they experimented with new ideas by price-cutting and selling-at-cost methods. This trouble was the result of what the speaker termed "minor functioning," for example, the central station goingg into the retail business, or a manufacturer into jobbing or retailing, or the jobber starting retailing. An unbalanced condition of the industry was brought about. To present this question to the minds of engineers so that they would understand it was the idea he had struggled with for 15 years and finally he had come to the Wheatstone Bridge.

Mr. Goodwin here displayed a diagram illustrating the analogy between the Wheatstone Bridge and the electrical industry, which he proceeded to explain. In the Wheatstone



The Human Wheatstone Bridge—"How particularly appropriate it is that the connections of an electrical instrument best indicate the correct commercial relations in the electrical industry."

Bridge the source of energy was the battery, and this battery was likened to the public, which supplied the energy to the electrical industry in the form of capital. The moment this flow of energy was stopped the industry would cease to operate. Therefore the relation of the public should be one of confidence. Mr. Goodwin proceeded to further explain the analogy between this industry and the Wheatstone Bridge, as follows:

"The battery, the source of energy, represents the public, whose investors furnish the capital for all branches of the industry. This capital, the manufacturer converts into gathering and distributing equipment for the central station or industrial plant or into appliances and supplies. His sales diverge as shown in the diagram, dependent upon the principal class of product utilized by each branch. The central station has electric service as its principal product which, it will be noted, is used through the wiring installed principally by the contractor-dealer. The wholesaler has, as his principal function, problems affecting wholesale electrical merchandising. He makes contact with the central station or the contractor-dealer in passing to the consumer. The contractor-dealer thus becomes the point of retail contact of the manufacturer, central station, and wholesaler with the consuming public which, by the way, following the circuit, brings us back to the negative side of the battery, thus completing the analogy."

Mr. Goodwin said it was not his intention to assert that any branch of the industry should be prevented from entering into the business of other branches, but that each should recognize the principal business of each group and all should get together in synchronism. He did not contend that the idea was necessarily the best for the people of Canada, but he did contend that they should get together on some kind of plan developed from the best ideas of the men of the industry. He also referred to the planks of the "Goodwin Plan" which had been brought out because many had misunderstood the idea. They came to meetings and forgot the good things they heard, but only remembered the one point that happened to hurt their pocket books or their pride.

Mr. Goodwin believed that before December 31, 1919, they would have completed the plans and specifications for the electrical structure which had been his dream for a great number of years. He thought that in Canada also we recognized the opportunities and were ready to take advantage of them, and he would be glad to do all in his power to help the movement along. It was a great pleasure to him that his work had been of assistance to the Ontario Association of Electrical Contractor-Dealers. He had not gone into the work for personal gain, for his term of enlistment ended in December next, when he was going to sever his connection with the electrical industry and go back to his farm in California, neither had he gone into it for glory, for he had found that when any one attempted to bring a constructive measure into effect, he was subjected to as much criticism as praise. Some day, however, he hoped the dream might be realized of an international electrical organization with a great big object in view—the serving of humanity.

Mr. Goodwin was accorded very hearty applause, and Mr. Buchanan aptly suggested that the terms of his enlistment in the work of the electrical industry should have been the same as those of the soldier in the army—three years or the duration of the war.

Discussion

The meeting was then thrown open for questions and discussion. Mr. Sifton, of Hamilton, asked if Mr. Goodwin had considered whether there should be a clause in agreements that there should be no remuneration for services not rendered—for instance in the case of a wholesaler who did not carry a stock sufficient to give proper service.

Mr. Goodwin said compensation for services not rendered was uneconomic and sooner or later would fall of its own weight. By discussion of the question they would finally reach an idea of service to be rendered by each factor, and its value. He had been working on a formula for more than seven years which he hoped he would be able to present before the year ended and which would make it possible to measure the value of any given service. When he first presented this scheme to the professors in the University of California they said it could not be worked out, but he had managed to work it into a tangible proposition. Many of our policies, he said, were fundamentally wrong. In the old days in the States, when they were developing the industry and had little knowledge of the problems before them, they had formed organizations primarily for the purpose of price fixing. Now price-fixing had been made illegal in the States. Under that system, which was uneconomic and illegal, they did not attempt to measure the value of services, but arrived at the results in an arbitrary way on the basis of barter and trade, or a give and take proposition, and not by scientific methods. However, consideration had been given to a scientific proposition—price-making. The difference between price-making and price-fixing was that the former took into account all the factors in the industry—manufacturing, warehousing, wholesaling and retail distribution. Here, the speaker referred to the unfair advantage which some jobbers took of the differential they obtained. The jobber receives 40 per cent. on a given commodity and a part of that commodity he sells at 25 per cent. to the dealer and a part he sells retail. In one case the jobber has 40 per cent. while the retailer has only 25. Some kind of system must be developed that each interest shall be compensated at the same rate for the same service. He has a way of doing this but to suggest it would immediately create opposition because the various interests were enjoying unfair benefits. The eventual solution, to his mind, was this—that a single discount on a given quantity of goods should be the same for wholesalers and retailers and that wholesalers be given compensation only for the part of the commodity he sold to the retailer and that he should not be allowed to make this compensation on what he sells to the public. The result of the present policy had been that compensation had been given for services not rendered. The real answer would come when we got a formula just like that for measuring wire. It would be a clean cut proposition for measuring the value of services when we know the value of the work necessary in connection with the various commodities. Bare copper wire, for instance, could be handled at an expense, for warehousing and wholesaling, of about 2½ per cent., whereas ice machines, dish washers and such like, have an overhead of over 40 per cent.

In response to a question as to whether there was an organization in the States for bringing all the electrical interests in the States together, Mr. Goodwin replied that about ten days previous the contractor-dealers had appointed a committee to meet with other groups and discuss the matter with them. He had also attended a meeting of the National Electric Light Association called for the same purpose, and the jobbers had already authorized a committee. Within the next 60 or 90 days it was probable this organization would be formed.

Socialism and Bolsevism

Mr. Yates, of St. Catharines, referring to the plan of co-operation on the analogy of the Wheatstone Bridge, declared that he did not believe this could apply to the Hydro-Electric Power Commission, as they were opposed to all other public utilities, and indeed to every interest entering into the Bridge. They conflicted with the manufacturing interests by the placing of big orders which unbalanced the trade and they clashed with the retailer in the matter of prices. In fact they were "agin the government" every time.

In reply, Mr. Goodwin said he hardly believed Mr. Yates meant just what he said. If he were to take him literally he would understand the Hydro to be organized along lines of extreme socialism, and with that comes Bolshevism. We had seen a nation—one of the greatest in the world, for we must give the devil his due—destroy itself in four years by that same spirit. "You would build up in Canada," he said, "an autocratic power that would tear itself to pieces. There is no reason why this organization, on the principle for which it stands, should attempt to destroy all privately owned institutions. If I were to take you literally, I would understand that the only reason you are not destroying them is that you lack the ignorance or the courage of the Bolsheviki. You possess that thing which is just as bad—fear."

"Is it not a fact," continued Mr. Goodwin, "that in the past year the Hydro was unable to supply all the power needed for munition work and that the privately owned companies supplied the deficit? In that case your interests did not conflict, as you assert. But I don't for a moment believe you mean what you say or that you're as bad as you try to make out."

Mr. Ireland, Ontario Hydro, agreed with Mr. Goodwin. During the past ten years, he said, they had been trying to work out schemes of retailing, forgetting all the time that it was minor functioning, while their primary function was the generation of electricity. In merchandising they had fallen most lamentably, because they had started out to merchandise goods in the same way as current. They had thought to increase sales by cutting down the price of irons to $3.50, but the result was the contractor-dealers' sales fell down and less electrical goods were sold. He did not believe they should be opposed to any of the other interests in the industry. He thought the case of Windsor, previously mentioned by Mr. Perry, illustrated this, as Mr. Perry had shown, large increases in sales without antagonizing the local dealers. The supply of current was a natural monopoly, but the merchandising of electrical goods was not. They had started out interfering with other citizens, which they should not have done in any shape or form, and he believed most of them now realized this fact.

Mr. Phelps, of Sarnia, did not think that the central stations should take up retailing on any basis. Their business was to sell current.

Central Stations Can Exploit New Devices

Mr. Goodwin, in reply, said they had tried out all the different ideas in the States, and he did not agree that the best development of the electrical industry would result through the central station keeping out of the appliance business. Merchants, as such, were primarily in the business for profit, and it was not to be assumed that they were going to re-invest all of their profits for the exploitation of an unknown quantity. The electrical business was only in its infancy and within the next 25 years there would be thousands and thousands of new products of unknown merit, which the ordinary dealer could not afford to exploit. As an instance, he mentioned the ice machine. There was no doubt as to the merits of this machine, but the margin of profit was so small that the merchant could not handle it profitably. His idea was this: That the central stations conduct high class retail stores; that they sell their goods on a just basis; that the profits derived from goods of proven merit be set aside for use in the introduction of new devices, on which, due to limited production, there is a small margin. For this purpose, however, the central station could use 100 per cent. of its profits. There were 20 or 30 new devices brought out every year, and once their value had been impressed on the public through the efforts of the central station, the small merchant could then handle them profitably.

Mr. Buchanan said there was no doubt that it was the part of the central station to exploit new devices. In London they had sold over 700 ranges and he did not think they had made much profit on them, but now the ranges were being sold at standard resale prices and producing a fair profit because the people had been brought to believe that the electric range was the proper thing to cook on. He also suggested that they should not run ayay with the idea that they were selling devices merely for the purpose of creating revenue. The revenue on an ice machine would be very small, but if it could be marketed at a reasonable price, it would prove a great household comfort, and as a publicly owned utility they should keep the idea of human comfort in view rather than a big load.

Mr. Madden pointed out that it had been necessary for the municipalities to enter the appliance business for the purpose of building up load. During the early days they had to fight considerable opposition, and no doubt they had made mistakes, but unquestionably if the local Hydro stations took up merchandising on sound principles, it would be to the advantage of all concerned.

Mr. Chapman said that quite frequently, in their line of business, they had found it a decided advantage to have the central stations exploiting high-priced electrical stuff.

The discussion being closed, a hearty vote of thanks to Mr. Goodwin was unanimously passed.

Mr. Scott moved an amendment to the constitution as follows: To the clause "Commercial members shall not hold any office," there should be added, "except as members of committees."

Officers for 1919-20

President, O. F. Scott, Belleville.

Vice-president, M. K. McHenry, Walkerville.

Secretary, S. R. A. Clement, Toronto.

Treasurer, R. C. McCollum, Toronto.

Division vice-presidents: Niagara, P. B. Yates, St. Catharines; Central, W. E. Reesor, Lindsay; Eastern, H. F. Shearer, Smith's Falls; Northern, R. H. Martindale, Sudbury; Georgian Bay, E. J. Stapleton, Collingwood.

Papers Committee: H. H. Couzens, Toronto Hydro, chairman; L. G. Ireland, Ontario Commission; E. V. Buchanan, London Public Utilities Commission; A. B. Cooper, Canadian General Electric; C. H. Hopper, Canadian Westinghouse Company.

Conventions Committee: V. S. McIntyre, Kitchener, chairman; E. I. Sifton, Hamilton Hydro; R. T. Jeffrey, Ontario Commission; Geo. C. Rough, Packard Electric Company, St. Catharines; J. W. Bailiss, Niagara Falls.

Rules and Regulations Committee: A. T. Hicks, Oshawa, chairman; T. C. James, Ontario Commission; E. H. Porte, Renfrew; R. H. Stafford, North Bay; H. F. Strickland, Ontario Commission.

On a vote being taken it was decided to hold the next convention in June, at Niagara Falls.

A contract has been awarded to the Canadian Westinghouse Company for the supply of two generators for the Hydro-electric Power Commission of Ontario, for installation at Queenston, on the Chippewa development. Each of these turbines has a capacity of 45,000 kv.a., operating at 187.5 r.p.m.

"The doctor says I am working too hard."

"I'd put more faith in that diagnosis if it came from your boss."

Sherbrooke Plant Has Successful Year

The city of Sherbrooke have just issued a comprehensive and very gratifying report of the operations of the electricity and gas services of that municipality for the year 1918. The report also includes figures covering ten years of operation of electric energy supply under municipal control. During the past year the revenue was $286,609.60 in the electric department as against an expenditure of $136,317.25, leaving a balance of $150,292.35 to transfer to depreciation and profit and loss accounts. The gas service showed only a small deficit. During the past ten years the total value of Sherbrooke's municipal plant was increased from $35,365 to $2,151,390; the surplus from $99,190 to $684,281, and the yearly revenue from $9,437 to $111,118. The generating capacity, with the addition of the latest plant at Weedon, is approximately 6,000 kv.a. Regarding the power factor of the system the report has this interesting item:

"The power factor of the system was determined by test at 65 per cent. and it is evident that if this power factor had not been corrected by the use of synchronous motors, the plants of Rock Forest and Frontenac Street would have been only able to generate 65 per cent. of their generating capacity at 100 per cent. power factor or 65 per cent. of 4,200 kw., equal to 2,730 kw.; instead of this, and after having raised the power factor to 88, we were able to sell 88 per cent. of the generating capacity of both plants, being 3,700 kw. It was also possible to carry a load of 4,200 kw. with a power factor of 85 per cent. without exceeding the 25 per cent. over current guarantee of the manufacturers. From the above, the result is that the power factor correction has enabled the department to sell 970 kw. which could not have been obtained from the system at 65 per cent. power factor; and this was done without overheating the generators. In addition to this, the correction of the power factor has enabled the Department to establish a system of automatic voltage regulation far superior to the one in use up to this date.

"The by-law No. 373, containing the clause stating that the power factor should be maintained at 85 per cent. by the customers, the correction of this power factor on the various accounts of these customers brought the total sum of $7,428.00 from the 1st of June to the 31st of December."

The financial statement is signed by B. Arthur Dugal, secretary, and the report of the operations of the electric department, by C. J. Desbaillets, manager and engineer.

Obituary

Mr. W. K. Greenwood, chief engineer of the Orillia Water, Light and Power Commission, Orillia, Ont., died recently of Spanish influenza. Mr. Greenwood was a graduate of the Faculty of Applied Science and Engineering of the University of Toronto, in the class of 1904; a member of the Engineers' Club, Toronto; an Associate member of the Engineering Institute of Canada; an Associate of the American Institute of Electrical Engineers and was well and very favorably known in engineering circle..

The death occurred on February 2nd of Hydro Commissioner Col. William K. McNaught, C.M.G., Toronto, at the age of 74 years. He was president and manager of the American Watch Case Company, but, despite the demands made upon him by this business, was prominent in varied industrial and development projects. He had been president of the Canadian Manufacturers' Association, a member of the Ontario Legislature, chief executive of the Canadian National Exhibition and an active and enthusiastic member of the Ontario Hydro-electric Power Commission since 1906.

The Contractor-Dealer

We May As Well Face the Facts: We In the Electrical Business Are Not Merchants Yet, But We Are Not Too Old To Learn

When all is said and done we are forced back to the one conclusion that "merchandising" is the big word in the electrical industry to-day. What is the use of manufacturing if we can't sell?

And the next fact we must face is that electrical men are among the poorest merchandisers in the world.

Under the circumstances there is only one thing to do—we must **learn** the merchandising business. Presumably it is no disgrace that we find ourselves in this position, but it will be disgraceful and quite unpardonable if, knowing the plain facts, we do not busy ourselves to remedy conditions. Electrical goods, up to the present time, are being sold either by central stations which are, for the most part, in charge of engineers, or by contractor-dealers who have not yet been able to forget that they were contractors before they were dealers, and still look upon this part of their business as the most important. What chance then have such inexperienced merchandisers in competition with the experience of hundreds of years in other lines of trade, and what wonder that hardware men, druggists and retailers in other lines are invading the electric man's field—and making a success of it, too. Why? Because they **know** the merchandising business.

When Mr. Goodwin was in Toronto on January 30 - 31, he spent part of an afternoon visiting some of the retail stores and, in the evening, when he met the contractor-dealers he gave them a criticism on what he had seen. In the main his advice was—employ a competent man who has the necessary knowledge and experience to take charge of your store and leave it to him. He described how similar conditions to those existing in Toronto and most eastern cities had been improved by the appointment of a Health Committee, whose duty it was to visit the different stores regularly and see that they were sanitary and wholesome—otherwise report them to the city health department. He pointed to the futility of publicity in connection with most electric stores—no well dressed woman would care to go into them for fear of soiling her clothes. In consequence people got the idea that electrical appliances were messy, dirty and untidy, instead of the reverse, which was the fact.

The speaker pointed out how necessary it is that every contractor should also be a dealer. Contracting in itself is not and never can be, a "business." It is merely a means to an end. So many uncertainties are associated with wiring jobs that they will always remain more or less of a gamble. Merchandising electrical goods, on the other hand, can be placed on a thoroughly sound and scientific basis. The contractor-dealer must learn to sell the electrical appliance idea, the picture of the well equipped electrical home, for example, rather than the mere bits of wire running up the walls. Wiring is a mere incidental in the outfitting of the electric home, absolutely devoid of interest to the owner. Mr. Goodwin's advice was that the contractor-dealer should forget, as far as posible, that he is a contractor and remember only that he is a merchant.

Incidentally, it was pointed out, there is more money to be made in selling electrical goods than in wiring buildings.

The price of an electrical appliance is not a big factor in its sale. Much more depends upon its proper demonstration. In many localities the larger appliances must be sold on the instalment plan and the Association, as a body, should endeavor to make arrangements with some bank or other financial institution for discounting these instalments, otherwise the investment charges are beyond the reach of the average contractor-dealer.

Mr. Goodwin described a number of "kinks" he had worked out on the Pacific United States coast to keep the various sections of the trade wide awake and working in unison. For example the contractor-dealers had a chart showing the attendance of the members at their meetings. This was photographed monthly and copies were mailed to the various jobbing houses so that these may be in a position to know which of their customers were taking an interest in their business as shown by attendance at meetings—and who were slackers. The same scheme was followed with respect to dues paid and owing to the Association. If a man was behind with his dues he naturally was not as good a credit risk as the man who made prompt payment. A standardized accounting system was also recommended, not only because it was essential that each dealer should have a proper system of accounts, but also for convenience of reference when the jobber was considering the amount of credit a man may carry. When the industry became properly organized it should, perhaps, become the duty of a jobbing house to see that their customers all used an accounting system so nearly identical that judgment and comparisons could be made without waste of time or danger of error and credit should be refused to all contractors who failed to install and operate such a system.

Shall the Central Station Conduct a Retail Store?

Perhaps the one question, more than any other, that members of the electrical trade were anxious to hear Mr. Goodwin's opinion on was: should the central station retail electrical goods? And the answer was absolutely definite—"By all manner of means." Mr. Goodwin hastened to add, of course, that the central station must, however, respect the laws of good merchandising. No price-cutting; no selling at cost. That was unfair competition and consequently bad business. Therefore, sooner or later such a procedure must end disastrously.

There is no evidence in sight that the competition among the various electrical stores is so keen as to cut into the business of any of them. Indeed, the contrary appears to be the experience, i.e., that the more stores there are, the more general information is handed out to the consumer and in consequence the more goods there are sold. The merchandising of electrical devices has not yet approached the saturation point and, according to statistics on areas that have been most thoroughly worked over, the average district will absorb about ten times the value of electrical devices now being sold to the consumer. Plainly, therefore, the competition of the central stations is a matter of merely infinitesimal importance compared with the possibilities for increased business by enlisting their assistance in advertising campaigns and in pioneering—granted always, of course, that the central station learns how to conduct a merchandising business and follows recognized sound practice.

The value of the co-operation of the central station is seen most, and their function is more clearly defined, in the exploiting of new appliances. Mr. Goodwin instanced the case of washing machines which the public had at first been slow to appreciate the value of. It was quite beyond the capital means of the average contractor-dealer to stock and exploit a number of different makes of washing machines, but quite possible for the central station. As soon as this machine became a recognized part of the electrical industry. the dealers took it up and left the pioneering work of some other article to the central station. While Mr. Goodwin admitted that the primary function of the central station was to sell electric current, on which business the income properly depended, he contended that there was also a secondary function of merchandising which should not be conducted for profit, but still should carry its own capital charges. The only difference between a central station shop and a private contractor-dealer's shop would be that the profits of the former should be put back into the exploitation of new devices. This he considered a perfectly proper and correct attitude for every central station to adopt.

The Open Bidding System

What do you mean by the "open bidding system"?

This question at the contractor-dealers' meeting on Friday evening, January 31, in Toronto, brought Mr. W. L. Goodwin to his feet with an exclamation and something like an execration: "Not know what open bidding means? Why man you are twenty-five years behind the times. Do you mean to tell me you have none of you ever tried out the practice of open bidding?"

Briefly described, this system works as follows: Suppose a half dozen contractors, A, B, C, D, E. and F, are bidding on the same job. They first appoint a disinterested party, X, who will act as a clearing house for the bids. Then as each contractor sends his tender to the owner he also sends a copy to the clearing house, X, i.e., the confidential clerk X will have in his possession copies of the bids of A, B, C, D, E, and F on this certain piece of work. The work of X now consists of making five copies of each of the bids and, (with or without disclosing the names of the bidders as may be mutually agreed), distributing to the various contractors. For example A's figure is mailed to B, C, D, E. and F. B's figure is sent to A, C, D, E, and F and so on. Each contractor thus has the other five bids in his possession for comparison with his own.

Sometimes the practice is merely to exchange totals. In other cases the various items are freely exchanged so that each may check up his own figures and see where any error has been made. Frequently an error resulting in too low a bid has been located by a competitor in time to have this bid withdrawn or corrected and so prevent a loss to one of the contractors.

An exchange of bids in this way may occasionally result in one or other of the contractors submitting a lower bid, but Mr. Goodwin stated that in his experience this was a rare occurrence. In such a case where, for example, A decided to change his bid, he merely advises X who passes the new figures on to B, C, D, E, and F.

This plan was originally devised to protect the electrical contractor from the general contractor or the architect. For example it has frequently happened that the man who already has submitted the lowest tender, (but doesn't know it), is called aside by the architect and told: "We'd like to accept your bid but you are just a little bit high. Now if you could drop $200 we could fix you up"—and you have fallen for it because you were in the dark about the other bids. With the "open" system you yourself would have just as much information as the architect or the general contractor and could not be made a tool of. Another advantage of the open bid is that the various contractors soon begin comparing notes as to the method of arriving at their figures. In this way false formulae are detected and the whole problem of preparing estimates is placed on a scientific basis. Instead of bids on a $3,000 job being $500 apart they would scarcely vary by $50 when each contractor followed an established system of computing charges.

In this system of open bidding it is to be understood, of course, that no member of the contracting trade gets copies of bids unless he has himself submitted a tender and handed in his figures to the clearing house, X.

A dozen Toronto contractor-dealers signified their willingness to try out the plan and it will be put into effect forthwith.

Manufacturers and Jobbers Organize

Canadian manufacturers and jobbers are taking steps to organize separate associations to work in with the Goodwin plan of co-operation. On Friday evening, January 24, a joint meeting of manufacturers and jobbers was called in the King Edward, Toronto, at which the question of the best form of organization was fully discussed. Mr. C. A. McLean, manager Masco Company, presided. Finally two committees were appointed—one from the manufacturers, the other from the jobbers—who were separately required to bring in a report and, in the meantime, get in touch with those members of the trade who had not been able to attend the meeting. It was also decided at this meeting that an invitation be extended to Mr. W. L. Goodwin to address them at some convenient hour during his visit to Toronto, to attend the convention of the Ontario Association of Municipal Electrical Engineers. Money was voted on the spot to cover incidental expenses and the committee became active at once. Manufacturers and jobbers outside of Toronto were communicated with and prominent advertisements inserted in the daily papers.

Various committee meetings were held during the following week so that by Friday, the 31st, everything was in readiness for Mr. Goodwin's visit. The meeting was called for the afternoon in the Board of Trade assembly rooms and a thoroughly representative attendance indicated the interest that had been aroused. The chair was taken by Mr. M. K. Pike, general sales manager Northern Electric Company. Mr. Goodwin spoke for two hours of the advantages of co-operation of the various elements in the electrical trade—which pre-supposed organization—and outlined in detail the Goodwin plan.

Following the address and a brief discussion, the members expressed themselves ready for organization and the manufacturers and jobbers retired to separate rooms. The members of the jobbers' section were unanimous in their opinion that an association should be formed and appointed a committee to prepare a tentative constitution and offer suggestions for the general working out of the scheme. The committee consists of Messrs. M. K. Pike, (Northern Electric), chairman; L. O. Horner, (Canadian General Electric); C. A. McLean, (Masco Company); M. S. Pierce, (McDonald & Willson), and two members to be named by Montreal jobbers. This committee will report at a time and place not yet determined.

The manufacturers also were of the opinion that the time was ripe for an association and appointed a committee consisting of Messrs. R. E. Callahan, (Majestic Electric Company), chairman; F. John Bell, (Canada Wire and Cable Company); William Mulveney, (Canadian Tungsten Lamp Company; C. F. R. Jones, (Northern Electric Company); Dan. Logan, (Sunbeam Lamp Company); J. E. Pelletier, (Solex Lamp Company); Frank T. Groome, (Benjamin Electric Company) secretary, and J. Herbert Hall, (Conduits Company Limited). This committee will also draft a constitution and rules of procedure and report at a later date.

Electric Merchants As Seen By One Who Calls on Them

"The Merchants among the people shall hiss at thee. Thou shalt be a terror, and never shalt be any more."

That is a text for most contractor-dealers and while it is biblical it is not a lamentation of a "Stickit Minister" or a "Jeremiah." It is for you who call yourselves merchants among merchants—who not only say "We can't sell electrical appliances," but worse still, act (if you you do not say it). "We won't sell appliances." Yet, all the time you act thus you carry the appliances in your stock, and the great bulk of you, even in the Canadian metropolitan centres, have all the stereotyped excuses:

"The jobber or manufacturer does not give sufficient protection."

"The central station does not play the game."

"The departmental store cuts the prices."

In the face of all this we find the brilliant exceptions to whom the text does not apply in Sault Ste Marie, Hamilton, Peterboro, Kitchener, Sudbury, London and, fortunately a few others. All these successful vendors of electrical appliances have one prerequisite in common—sufficient capital and credit to make the game go. Granted credit is not the only essential yet without it the most brilliant plans, the best merchandising schemes, all your tact push and principle will not win out.

Assuming then that you who are not successfully selling appliances can command sufficient credit—what ails you?—Some one or all of the following:

You are afraid to advertise,

You are afraid to invest in suitable and attractive shop fixtures,

You are afraid of reasonable rents,

You are afraid of your jobber,

You are afraid of the public,

You are afraid of yourself, or

You don't understand the first essentials of merchandising—you are a misfit in this business.

Before discussing in detail practical ideas for selling appliances which you retailers can put into effective practice with a minimum of effort, let us get down to some basic principles. If with all these successful examples in Ontario, (with no more credit than you have) you cannot alone conquer your fear, your case is hopeless,—to those of you who are not afraid, these messages are directed:

Move your office and shop from the back street to a spot where the traffic and transient trade is denser. Put in an attractive front and get your goods in the window—not your whole stock (the conglomerate mess that some of you show) but a pleasing and discriminating rotation of stock. Dress up your store and, just as important, dress up your young men—clean linen (even if frayed), shined shoes, (even if patched), manicured nails (even if trimmed with a scissors), clerks that can speak reasonably decent English, active, painstaking, polite, ambitious, careful, forceful, clean young men, preferably between the ages of 17 and 20, who have matriculated or spent some time in the High School and a year in overalls as a wireman's apprentice, or in the assembly or shipping-room of a jobber. Quite likely, at your start, you need only one; the woods are full of such youngsters. All you have to fear from these coming merchants is that they will own your store or their own competing establishment some fine day.

Having done all this, deal with responsible jobbers who furnish data, literature and mechanical helps to the retailer—jobbers who handle recognized and reputable irons, toasters, percolators, chafing dishes, ranges, table stoves, sewing machines, washing machines, dish-washers, portables, heaters, unit package fixtures, counter sale fittings, vibrators, fans, lamps and the hundred and one items that are profitable and which the public has long since been educated to buy and use.

Don't mix your "dealer business" with your "contractor business." Know absolutely the separate overhead on each. Know what your fixed investment should be by months and seasons. Know how many times a year you must turn over your entire stock. Engage an accountant to conduct a running audit. If you begin in a small way you can have this done for about $10.00 a month. I know one very successful dealer-contractor in a town of 20,000 population who started on less than $1,000 capital, who conducted a running audit for $5.00 per month the first year and even now, after six years in business, with an annual turnover of $60,000, has a running monthly audit for less than $150 per year. And this same dealer-contractor established all the credit he needed both with the bank and jobbers, principally by **sending his creditors every six months—unasked—a certified statement,** showing his exact standing, with a copy of his inventory.

The credit manager of any responsible jobbing house is your very best friend. He will open your books for you and coach your bookkeeper. He will advise you how to determine your overhead and your required turnover. He will willingly assist you to analyze your auditor's statement. He will co-operate in every sense of the word and he has nothing to sell you but his services, and the cost of this service is in the legitimate cost of your electrical goods. He is working with you on a reciprocal basis for his own house, and he wants you to succeed. I know a credit manager of a large jobbing house who makes frequent trips to several towns to go over the books and accounts of several contractor-dealers at their invitation. He constantly educates them to discount their bills, to get in their collections, to develop a cash business. He almost makes the sales manager's life miserable importuning him to study the retailers' end so that the contractor-dealer shall grasp at once all the best ideas for moving his appliances.

Unless you are going into the contractor-dealer business on the foregoing principles, your stock of one-half dozen irons will increase to twice their invoice price by the time you must give them away. Your washing machine will tarnish and rust, your vacuum cleaner bag will be moth eaten, dissolution will finally set in in the contractor end of your business and you will rot away. **You become a carpet bagger**—and "The merchants among the people shall hiss at thee."

The Ontario Safety League, Royal Bank Building, Toronto, have issued their fifth annual report, being a brief statement of the fire and accident prevention campaign conducted during the year 1918. The booklet also contains a preliminary report of the Canadian National Safety League, Inc.

Introducing Co-operation Into Competition

One of the new ideas to be introduced by Toronto Electrical Contractor-Dealers is the open price bid. This is referred to briefly elsewhere in this issue, but a more complete explanation of the plan was recently given before the Boston Association of Contractor-Dealers, by Dr. Henry R Tosdal. Extracts from this paper are given below.

During the past few years, there have been great advances in the way in which men act and feel toward each other. It has been impressed upon us more than ever that we have common interests, and in particular trades there has grown up a greater sense of interdependence. We find the members of the trade co-operating gladly with the Government for the attainment of Government aims. We find that, in such co-operation, the men in the trades have become better acquainted with each other and have learned that the competitor is a much different man personally from what they had supposed him to be. We are learning gradually that the purpose of true competition builds up a trade, while cut-throat competition destroys competitors.

The electrical contractors of New York have tried out the open price plan and have been converted from skeptics to enthusiasts in the course of a comparatively short time.

Briefly speaking, applying to electrical contractors the plan is as follows: Each contractor sends a copy of each bid to a central and impartial agency; bids are exchanged between those bidding on the same contract. Arrangements are made so that a contractor's bid need not be exchanged until after the contract is awarded. The contractor who does not wish to have his bid exchanged among other bidders will not receive information as to the other bids.

When the contract is awarded, the successful bidder notifies the office, and the information is sent to the other bidders. That closes the history of that particular bid, except in so far as the figures appear in the general statistics issued at the end of each month.

There are numerous advantages to the contractor in the open price organization. First, through the operation of the plan, the old attitude of suspicion and secrecy is completely done away with. Instead, there appears an atmosphere of frankness and openness, which renders business much more pleasant to transact, but which does not do away with healthy rivalry of competing concerns. Each member knows whether or not his share of the business is increasing or decreasing. Further, if a contractor finds that there is an unusual difference between his bid and someone else's, it may cause a thorough re-examination, which has not infrequently led to great saving through the discovery of mistakes in estimating. More important is the information that the contractor secures with regard to the general range of bids, which protects him from misrepresentation on the part of general contractors or owners as to the amount of competitors' bids. Under this plan it becomes impossible for the general contractor to go to the low bidder and tell him that he can have the contract if he shades the price. In more general terms, the contractor proceeds upon the basis of true and accurate information, instead of upon the basis of rumors or insinuations or plain lies of those who are interested in beating down the price.

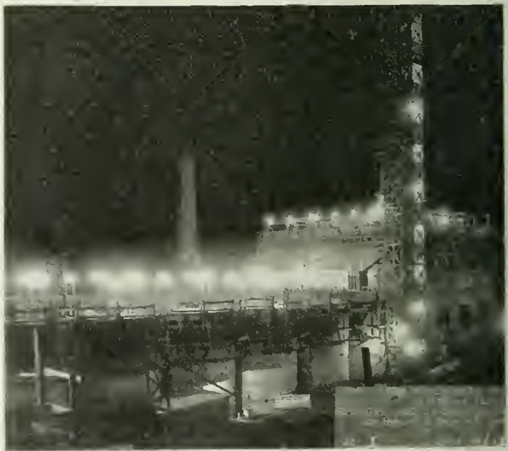
In the long run, the contractors or producers in general cannot control the forces of supply and demand. Stability by agreed prices is not sound; in fact, it is impossible. Stability can be secured only by each contractor or manufacturer making his own prices independently, but on the basis of reliable information.

The open price association furnishes this information promptly and accurately to members. It deals only with past transactions and is, therefore, in full accord with existing law, as well as in accord with economic law. However those in charge of the operation of an association must have an intimate knowledge of the open price plan, its working and its results, the law regarding it and trade association matters in general. Further, for the best utilization of the information, statistical experience is extremely desirable. In order to secure such experience several open price associations may be operated by one specialized organization more economically and more efficiently than if a full organization were provided for each one.

To me the future to the open price plan, or rather of co-operative competition, appears very bright indeed. It is a practical plan which gives the benefits of both competition and co-operation; the resulting stability is for the benefit of the contractor-dealer and consumer. A prominent business man has recently declared that, in the course of the next few years, all business would be conducted under the plan. Though that is perhaps too broad a statement, one may safely assert that in few lines of trade as yet have its possibilities been fully realized.

Illumination for Night Construction

The illlustration herewith shows night illumination at the Quaker Oats plant, Peterboro, recently rebuilt, where continuous construction was carried on. The current supplied for the light and power in the re-construction of this plant was available from the company's own power house, situated on the Otanabee River, about 2,000 feet from the building site. The artificial illumination for the night work on the concrete storage tanks and work house was accomplished by the use of 60 watt Laco tungsten lamps, attached to the moving forms about ten (10) feet above the floor line. These lamps were spaced approximately ten (10) feet apart on the tank forms, and eight (8) feet apart on the work house. No reflectors were used and the general result obtained was quite satisfactory.


Building Quaker Oats Plant—Night Work

For general illumination around the building site at night Davis flood lights, with 1,000 watt Laco nitrogen lamps were used.

How I Increased My Sales 100%

On Friday night, when the contractor-dealers of Toronto were in session, Mr. Goodwin threw in a few bombs just to make the members sit up and take notice. He told them that "selling" is largely a matter of psychology, (whatever that is). For instance, you can't sell an electric appliance to a woman at the door; she won't listen to you. On the other hand she will answer the telephone and talk to you by the hour. All women enjoy talking on the telephone, according to Mr. Goodwin. Also he says the proper time to sell a washing machine is Monday, (or Saturday, in preparation). Tuesday is no good and by Wednesday the housewife is positively set against them. Tuesday is the day for irons. The evening hour, seven to eight, is the best time to talk lamps, and so on.

Goodwin is right. There's a time for everything, even in selling electric goods and dealers are every day doing just as foolish things as the man who was advertising electric heaters on July 15 with the temperature at 85. Everything depends on catching your prospect at the right (I mean psychological) moment. And here's a little story of my own to prove it.

Not many months ago the spare time of my wife (and of many other good men's wives), was given over to Red Cross work—sew, sew, sew, till their legs and arms and eyes ached again. One day I looked in on them to see my wife about some little matter and here they were, a dozen or more of them, treadmilling away as if their lives depended upon it, (as in fact perhaps they did). Well you can imagine my first thought—why not an electric motor to operate these machines? And you can understand that, being some wide-awake salesman, I lost no time in having one sent up on trial. Of course the natural thing happened—every woman in the bunch tried it out and finally my wife reported that the other machines in the "party" were being neglected and the electric motor was being operated every minute of the time.

The other machines were neglected, but the electric was overworked

I know for a fact that I have since supplied sewing machine motors in four of the homes of those Red Cross workers and have no doubt other sales have been made as the indirect result of my bit of timely advertising. All these machines needed was a chance to sell themselves—they didn't need any talk from me, which all just goes to show the value of a knowledge of "psychology" on the part of a salesman. Like electricity itself, we don't need to know what it is, if we only know how to make use of it.

The Telephone City Electrical Club, Brantford, have re-elected the following officers for another year: President, F. Webster; vice-president, A. C. McLean; secretary, W. E. Lemon. Meetings are held the first and third Tuesday of each month at the regular club rooms.

Trade Publications

Condulets—Suggestion No. 39, by the Crouse-Hinds Company of Canada, illustrating types FSCC and HHC condulets for the control of circuits connected to loop installations. Both permit the fuses to be placed at any desired height from the floor.

The Harvey Hubbell Company of Canada, Limited, are distributing an interesting folder entitled "Reasons Why." This folder explains why manufacturers of the better class of portable devices have used Hubbell plugs for years as standard equipment. A number of devices are illustrated.

The Devoe Electric Switch Company, 414 Notre Dame Street West, Montreal, have issued a new catalogue of 100 pages. This is very fully illustrated and contains details, with prices, of knife switches, panel boards, switch boards, formed steel boxes, wooden cabinets, and other electrical specialties. The catalogue is well printed, and will be of value to dealers and others in the electrical industry.

The Cutter Company, engineers and manufacturers, Philadelphia, have issued an interesting folder entitled "I-T-E Circuit Breakers—Then and Now." Splendid illustrations are also enclosed of the I-T-E- three-pole, double-throw circuit breaker, 8,000 ampere capacity, for alternating current service, motor operated for remote control; and of the 20,000 ampere breaker, single-pole, solenoid operated, remote control.

Personals

Mr. F. W. Pennock, who for the past eighteen months has acted as electrical engineer to the Imperial Munitions Board, has rejoined the R. E. Cleaton Company, Montreal, whose business has recently been incorporated under the name of Cleaton Company (Canada) Limited, and will act in the capacity of general manager.

Mr. H. H. Boyd has been appointed assistant chief mechanical engineer of the C. P. R. He is a graduate in applied science of McGill University, and has been with the C. P. R. in several engineering capacities, including assistant electrical engineer and electrical engineer for the Western lines, at Winnipeg. In 1915 he was appointed superintendent of the Vancouver division, a position he now vacates to reside in Montreal.

Mr. Ronald H. Starr, B.A.Sc., has been appointed engineer in charge of the electric and water plants at Orillia, Ont., succeeding the late Mr. W. K. Greenwood. Mr. Starr is a graduate of the Faculty of Applied Science and Engineering of the University of Toronto, 1908, taking the postgraduate course the following year. He was for over six years with the Toronto Hydro-electric Commission and for the past two years with the Moloney Electric Company. He will take up his new duties about the middle of March.

Mr. E. T. J. Brandon and **Mr. E. V. Buchanan** have left for England on business of the Hydro-electric Power Commission of Ontario. Mr. Brandon is chief assistant electrical engineer to Mr. Gaby, chief engineer, and has made a specialty of power house, switching station and sub-station design. He is also chiefly responsible for the specifications of the new 45,000 kv.a. generators to be used on the Chippewa development, for which the contract has just been let. Mr. Buchanan is manager of the London municipal electric system, one of the most efficiently organized and best managed in Ontario. During the past year he was president of the Ontario Association of Municipal Electrical Engineers, which has met with such splendid success.

Four million metal discs have been ordered by the Boston Elevated Railway, to take the place of pasteboard tickets.

CURRENT NOTES

Hamilton, Ont.

Hamilton Street Railway receipts for the last quarter of the year 1918, amounted to $188,003, a decrease of $13,744 over the same period in 1917.

The Hamilton Radial Railway Company have resumed service between Hamilton and Oakville at the old schedule of rates, pending further developments.

Kingston, Ont.

The Kingston Street Railway Company have announced that no more conductorettes will be engaged and that the services of those at presesnt employed will be dispensed with and their positions given to returned soldiers.

London, Ont.

It is rumored that the London Street Railway Company will offer to sell out to the city as an alternative to their request for higher fares. The franchise expires in 1925.

Montreal, Que.

Fehr Brothers and Little, electrical contractors, Montreal, have registered.

Moosomin, Sask.

The town council of Moosomin, Sask., have under consideration the installation of an electric lighting plant to be purchased some time during the current year.

Newcastle, N.B.

The town council of Newcastle, N. B., is considering the possibility of a water power development to supply cheaper power for local needs. The most favorable site is at Ledden's Landing, on the Sevogle River, a tributary of the Miramichi, where a thirty foot dam would, it is estimated, provide for a development of about 500 horsepower.

Ottawa, Ont.

The Ottawa Electric Railway Company have made an offer to sell to the city at a figure of approximately $6,500,000 and has given an option until May 1. This price covers all the holdings of the company, including Brittannia Park and the Rockcliffe right-of-way.

Regina, Sask.

A bill empowering the cities of Saskatchewan to operate one-man cars, provisional upon securing the assent of the electors at the polls, has been passed by the Saskatchewan legislature.

Rocanville, Sask.

The town council of Rocanville, Sask., will secure figures on the cost of installing an electric lighting plant.

St. Catharines, Ont.

The Barrett Electric Company, St. Catharines, Ont., have sold out to A. J. Desaud.

Toronto, Ont.

Although the Toronto Railway Company carried 166,510,326 passengers in 1918, as compared with 158,087,894 in 1917, and although, as a consequence, it increased its gross income by $234,543, it has a surplus from the year's operations to carry forward of only $21,569, after paying a four per cent. dividend, whereas in 1917 it had a surplus of $134,840, after paying an eight per cent. dividend. In 1917 the gross earnings were $6,291,750; operating and maintenance costs $3,815,278; net earnings $2,476,481. In 1918 the gross earnings were $6,526,302; operating and maintenance costs $4,509,651; net earnings $2,016,651.

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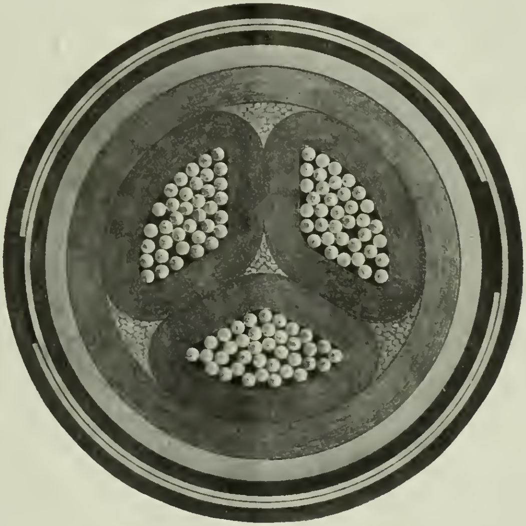

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Special Meeting Toronto Section A.I.E.E.

On the occasion of the convention of the Association of Municipal Electrical Engineers, on January 30 and 31, the Toronto section of the American Institute of Electrical Engineers held a special meeting in Room 22 of the Chemistry and Mining Building, University of Toronto, on January 31, at 8 p.m. The paper was entitled "Recent Advances in Illumination," by Mr. J. F. Heffron. Mr. Heffron has been associated with one or other branch of illuminating science for a number of years and has made a profound study of the subject. His paper was illustrated by slides.

"How To's," by the Society for Electrical Development

Dealers sometimes overlook the fact that in many cases women prospects who are uncertain or timorous when it comes to buying because of a fear that the appliances won't stand up, that the heating element will get out of order or require frequent replacing.

In this connection it is wise to convey to each prospect the knowledge that practically all heating devices are manufactured today under special license, in accordance with the most rigid requirements laid down by the Fire Underwriters, and that the great electrical interests of the country cannot afford to have any woman displeased; if she will just remember that it was only a few years ago when she had the same uncertainty about her incandescent lamp and contrast that feeling with the security and comfort that she enjoys today, she can be made to understand the extent of the development in electric heating units.

All electrical heating devices are liberally "guaranteed" in the sense that should fault or flaw develop the purchaser is safeguarded by the maker against loss. Dealers should add their own voice to the manufacturer's.

Interesting Window Stunt

A Western contractor-dealer, who was desirous of building up an increased "Service and Maintenance" business, tried out the stunt of putting a repairman in his window. The window was large enough to include a good sized work table and the necessary accessories. The workman repaired irons, cords, etc., in full view of the passerby. On a certain day the proprietor announced that he would overhaul without charge every electrical iron brought to his store on that day. The result was an influx of irons, many of which were not at all damaged. Those that were too much injured for easy repair he explained to the owners that it would require some time and would be an extensive job, necessitating return of the iron to the manufacturer, but that he had arranged with the maker to make an allowance in this particular case and it would not cost the owner anything. He had previously gotten in touch with an iron manufacturer and arranged to furnish that manufacturer a rough analysis of his product in that city. By advertising in this way the dealer found out about how many of the company's old irons were out of business, how the people like them, and how they were standing up, as well as just what was the principal trouble with the iron in question in that locality. This was a help to the manufacturer, and a good advertisement for the dealer.

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1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	30	2	60	220	720	Fbks.-M.
1	25	3	25	550	725	Westg.
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	20	3	25	550	710	Westg.
1	15	3	25	550	1500	C. G. E.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	Westg.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
1	5	3	25	550	1440	Excelsior
5	4	3	25	550	1400	Excelsior
2	3	3	25	550	1500	C. G. E.
2	3	3	25	550	1400	Excelsior
1	1	3	25	550	1400	Excelsior

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Generation, Transmission and Application of Electricity

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Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

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Vol. 28 **Toronto, March 1, 1919** **No. 5**

Electro-Culture as a Solution of our Depleted Farm and Garden Land

Now that the war is over and we have time to settle down to work that demands experimentation and research covering extended periods, one of the first items to which it appears we should turn our attention in Canada is more intensive cultivation of the soil and, in this connection, the value of electricity, not only as a motive power, but also in reference to its influence in stimulating growth. Canada has done nothing in this direction, nor indeed have any definite results been obtained on this continent. Possibly the idea of intensive farming appeals to us less because of our tremendous fertile areas which hold out alluring prospects of landed proprietorship—not always justified by the dividend returns on capital expenditure.

It may be that the cultivation of large areas by individual farmers will continue to be the ideal in Western Canada for many years to come, but in Ontario and the East this system is becoming continually more difficult The conditions East do not lend themselves as readily to the extensive use of tractors and other large labor-saving machines. More important still, perhaps, the land in these older settled portions has become, to a considerable degree, exhausted and the problem of building up the soil again must be solved or production will gradually fall lower and lower

The use of electricity for both improving the quality and increasing the production has received considerable attention in England. They have tried treating the seed electrically before sowing, as well as treating the crop during growth. Last year about 2,000 acres of electrified seed was tried out by English farmers and gains all the way from fifty per cent. down to nothing were reported, but it was finally decided that 90 per cent. of the seed showed gains over untreated seed. We understand that some twenty-five plants for the electrification of seed will be in operation during the present year.

Electric treatment of growing crops may almost be said to have reached a commercial stage. The most recent reports describe experiments carried out at Llantwit Vadre in South Wales on last year's potato crops, which showed a difference of 12.6 per cent. between the electrified and the control crops. In 1917 the gain had been somewhat larger—17.2 per cent. The equipment in use in these experiments was of sufficient capacity to care for 100 to 150 acres and its cost was approximately $1,500. The amount of energy required is inconsiderable.

In view of the fairly satisfactory results obtained from this and other experiments it would almost seem as if we would be justified in trying out the electrification process of increasing our production in Eastern Canada. Just how far it would dispense with fertilization is not yet known but, as an auxiliary an experimental plant or two should give results to justify the expenditure.

Electric Generation and Distribution in Canada

A very complete report covering "Electric Generation and Distribution in Canada" has just been issued by the Commission of Conservation of Canada. The report is by Leo G. Denis, B. Sc., E. E., hydro-electric engineer to the Commission. The object of the report is to show the important place electric energy occupies in Canada and, at the same time, provide the various companies and individuals concerned therewith with information in other places. It will also serve, in large part, as a general power survey as, in most cases, the kind of power used to operate an electric plant in a certain district will be found the most advantageous.

The figures show that there is a total of 565 electric generating plants in Canada with a total capacity of 2,107,743 h.p., supplying 752 distributing systems of varying importance, covering some 975 municipalities. According to the kind of prime movers, this total is made up as follows: 270 hydro-electric plants aggregating 1,806,618 h.p.; 201 steam plants aggregating 288,202 h.p.; 49 gas plants, (mostly producer gas), aggregating 8,157 h.p.; and 45 oil and gasoline plants, aggregating 4,766 h.p.

The situation in various parts of Canada is well illustrated by the figures in this report. We find steam and water power in the Maritime Provinces, with a predominance of the former. In Quebec, Ontario and Eastern Manitoba, water power is the dominating source of energy for large centres and most of the smaller towns are supplied by electricity produced by water power. In the Middle West large plants are steam operated, while smaller ones use internal combustion engines. In British Columbia and Western Alberta, we again find water power predominating, but the generous coal supply in certain districts also permits considerable steam operation.

The ownership of the various plants included in the report is divided into 207 municipal or publicly owned plants of 452,508 h.p. capacity and 358 privately owned plants of 1,655,235 h.p. capacity.

Of the various plants, 274 give continuous service, night and day, while 220 give only a night service; these latter, however, are only small installations so that their total capacity is relatively unimportant.

An interesting diagram showing the distribution of power developments in Canada is reproduced from this report, on page 28.

First Technical Clearing House Opened

In our last issue we made reference to the great need of some government medium through which the returned technical men can be brought in touch with the various individuals, companies and municipalities who are in need of engineering assistance. Action has been very prompt and we are glad to be in a position to say that the government has considered the plan, put forward by a number of engineers, favorably and that details are being rapidly worked out. It is possible that by the time this reaches our readers some of the offices will have already been opened and placed in charge of technical officers. As far as possible the technical bureaus will be in close proximity to the employment bureaus already established by the government though the two departments will of necessity be separate on account of their entirely distinct fields of action.

In order to make these bureaus a success it will be necessary that they have the co-operation of all employers of technical men and more particularly the larger organizations that can absorb larger numbers. It is not possible yet to announce the exact location, but any information or inquiry addressed to the government employment bureaus and marked "technical" will doubtless, in the meantime, be properly re-directed. As soon as it is possible to gather the information it is planned to have on file, on the one hand, lists of all technical positions vacant, with particulars, and, on the other hand, lists and qualifications of technical men who are out of employment. Primarily this clearing house is intended for returned men, but, if it proves of sufficient value, may doubtless be extended in scope.

The head of the organization, we understand, will be in Ottawa and the present plan is to open technical bureaus in about ten or a dozen of the larger centres only—Toronto, Montreal, one or two cities in the East; Winnipeg, Vancouver, and two or three western intermediate cities.

[Just as we go to press the temporary location of the Toronto office is announced as 287 Queen St. West.—Ed.]

Experimental Demonstration of Power-Factor

At the afternoon meeting of the Association of Municipal Electrical Engineers, on Jan. 31st, Mr. H. W. Price, Associate Professor of Electrical Engineering of the University of Toronto, delivered a very comprehensive talk on Power Factor, accompanied by an experimental demonstration. The lecture was given in Room 25 of the Engineering Building.

For the purposes of demonstration an artificial transmission line was utilized, a line reactance being inserted in such a way that it could be shunted or placed in series with the line in order to demonstrate the effect of reactance on line regulation. At the receiving end of the line were placed resistance, reactance and capacity loads with ammeters in series with each of the loads, a line ammeter and a line wattmeter also being utilized. A reactive voltampere meter was also connected in circuit.

Preliminary to the experimental demonstration, Mr. Price developed non-mathematically, the general conditions of the alternating circuit and illustrated the nature and effects of leading and lagging currents by mechanical and other analogies. Then, by means of the apparatus the actual conditions in the circuit co-incident with the different classes of load, singly and in conjunction, were demonstrated and numerical results arrived at. The oscillagraph was then connected in the circuit and the voltage and current wave forms shown on the screen for the different classes of loads singly and in combination.

As a result of Professor Price's talk the members present were given a very clear and concise understanding of the question of power factor, particularly in its relation to power contracts and the cost of power.

The effect of low power factor on line regulation and methods of correction were also illustrated very clearly by means of the experimental apparatus.

Gres Falls Development Likely to Start in 1920

The Shawinigan Water & Power Co. continues to expand. The gross earnings for the year amounted to $3,621,074, an increase of $718,864, while net revenue, after charges and depreciation, amounted to $1,410,093, an increase of $59,229. Mr. J. E. Alfred, the president, explains that the operating costs were seriously affected, through the increased cost of labor and material, insulators, copper coils for generators, and many similar items having trebled or quadrupled in price. The various electric power companies owned and operated by the company had a satisfactory year, although increased cost of operation, due to extra labor and material costs, absorbed the slight increases which were made for power and light. These companies, generally speaking, had not been largely affected by the cessation of the war.

The year showed a very large increase in the total kilowatt hours generated for the Shawinigan system, the amount being 1,058,127,769 kilowatt hours. This figure represented an increase over the preceding year of 12 per cent. Owing to the heavy load conditions existing, the option, which the Shawinigan Co. had for aditional power from the Laurentide Power Co., was exercised. The next step was the development of the power at Gres Falls, a property owned by the Shawinigan Water & Power Co. This development has a capacity of about 100,000 horse-power, and would take two years to construct. The directors felt that the present is not a suitable time to proceed with this development. Engineering information was being obtained, and plans being made, which would be available when the proper time arrived to commence construction work. The work would probably be started in 1920.

During the year ended 31st December last the gross earnings of the Laurentide Power Co. totalled $870,393, an increase of $206,535, while the net revenue was $211,767, an increase of $106,972. The directors have declared an initial quarterly dividend of one per cent.

Dr. Jewett Lectures in Hamilton

By the courtesy of the Royal Canadian Institute, Toronto, the very instructive and interesting lecture on Industrial and Scientific Research was repeated by Lt.-Col. F. B. Jewett, Ph. D., Chief Engineer, Western Electric Co., New York, and Vice-President, American Institute of Electrical Engineers, at a meeting of the Hamilton Branch of the Engineering Institute of Canada, in the Royal Connaught Hotel. The lecture room was filled to capacity, and the numerous questions which were asked Dr. Jewett at the close of the lecture showed the keen interest taken by the audience.

Dr. Jewett first gave a discussion of the large problems of starting up and developing research work for manufacturing concerns in general. Very few companies are large enough to establish complete research departments, as the Bell Telephone Co., of the United States, and some other companies, have done. However, the smaller companies should not be deprived of the benefits of having their problems worked out by modern scientific research methods, and some co-operative reseach organization should be developed. In this the universities, the government, and the manufacturing interests should take part, various methods by which they could do so being discussed by Dr. Jewett.

One of the greatest difficulties encountered in carrying on research work on a large scale is the lack of thoroughly trained scientific investigators. Although Dr. Jewett expressed himself as being a firm believer in the great results to be obtained from properly conducted scientific research, he repeated a note of warning against attempting to build up research organizations without thoroughly educated and experienced research workers. He considered that such organizations should not be built up too rapidly, but should have a normal rate of growth, and he also gave warning against taking from the universities the men who are training future investigators.

Dr. Jewett then showed an interesting collection of slides, illustrating the results of the work of his organization. The long distance telephone line from New York to San Francisco, the multiplex telephone, the wireless telephone as used on war ships, destroyers, aeroplanes, and other remarkable developments in telephone work were described.

A vote of thanks to Dr. Jewett was moved by H. U. Hart, Chief Engineer of the Canadian Westinghouse Co. The Chairman of the meeting was E. R. Gray, City Engineer.

Dr. Jewett addressed the Canadian Manufacturer's Association of Hamilton, earlier in the day, on the subject of research, and his visit is expected to be productive of valuable results in the campaign for increased research work in Canada.

City of Toronto Buys Out Toronto and York Lines Within City Limits

Provided the new agreement between the city of Toronto and the Toronto & York Radial Ry. Co. is approved by the city council and ratified by the Provincial Legislature, the city will purchase the company's property and rights within the city limits for $590,000. For two years the city has been discussing with the company the acquisition of that portion of its Metropolitan Division within the city limits. Arbitration proceedings were being carried out under an Act of Parliament which empowered the city to buy out the company in return for the retention of running rights by the company at a value to be determined by arbitration. The agreement will close up the negotiations and render further proceedings by the Ontario Railway Board unnecessary.

The line of the Toronto & York Radial Ry. Co. which the city proposes to take over, runs between Farnham Ave. and stop 26 on Yonge St., a distance of 3.4 miles. The substance of the agreement is that the city purchase all rights, franchises and privileges owned or exercised by the company within the city limits, together with overhead and ground equipment, rails, etc., eight standard cars and all other property of the company within the city for $590,000 cash.

As soon as the agreement becomes effective, the company is to cease the operation of its cars over that portion of Yonge St. within the present city limits and will establish a terminal station near the northerly city limit. If the physical conformation of the land on the west side of Yonge St. immediately outside the limits of the city renders it impracticable to establish a terminal station at that point, the company may erect such a station on a site within the city limits and may operate its cars between the city limits and such terminal station on tracks which are to be constructed and maintained, with the necesary structures and overhead, by the city. For the use of these the company is to pay an annual rental of 7 per cent. per annum upon the cost of such construction.

The company derives the right to establish receiving and forwarding stations within the limits of the city, all such receiving, forwarding and terminal stations not to be situated on streets or squares or public places, and transfer of any package freight or express goods is not to be made on street or public places. The company has made arrangements for the leasing of space in St. Lawrence Market as one of these receiving stations, at an annual rental of $2,000.

Until the city acquires the street railway now operated by the Toronto Street Ry. Co. the city is to provide cars to carry package freight and express goods of the company to and fro between the new Yonge Street terminal and the terminal to be provided by the company near Farnham Ave. The city is to permit the Toronto Ry. Co. to carry this freight from the Farnham Ave. terminal station to the receiving and forwarding stations referred to above. When the city acquires the street railway, it is to furnish and operate cars to transfer the package freight and express goods to and fro between the new Yonge street terminal and the receiving and forwarding stations. The company's employees are to transfer the freight to and from the cars of the city at these terminal or receiving stations at the company's expense, but the cars are to be moved by the city when required by the company. The city is to be reimbursed for the granting of this privilege by the company's payment of depreciation and maintainance charges upon the cars provided by the city exclusively for the carriage of freight, and, in addition, interest of 6 per cent. per annum upon the cost of these cars. The company is also to pay the actual cost of platform labor and the actual cost to the city of electric power used in the transportation of such of these goods, except that no charge is to be made for power used from midnight to six o'clock. This provision is intended to induce the company to restrict traffic to these hours.

After the street railway is acquired by the city, it is, if the company desires, to construct and maintain on the public streets of the city, the tracks and necessary structures and overhead required to give access for cars to the receiving, forwarding and terminal stations and the company is to pay to the city the entire cost of the construction.

The new agreement also makes arrangement for similar transportation of package freight and express goods from the Mimico and Scarborough divisions of the company, should the city at any time operate any civic-owned car lines to points of contact with these divisions. A point of contact is considered to be established when any line of the company at the present city limits is within a distance of 1,320 ft. of a line operated by the city, measured along city streets, except in the case of the Scarborough division of the company where this distance is to be 3,300.

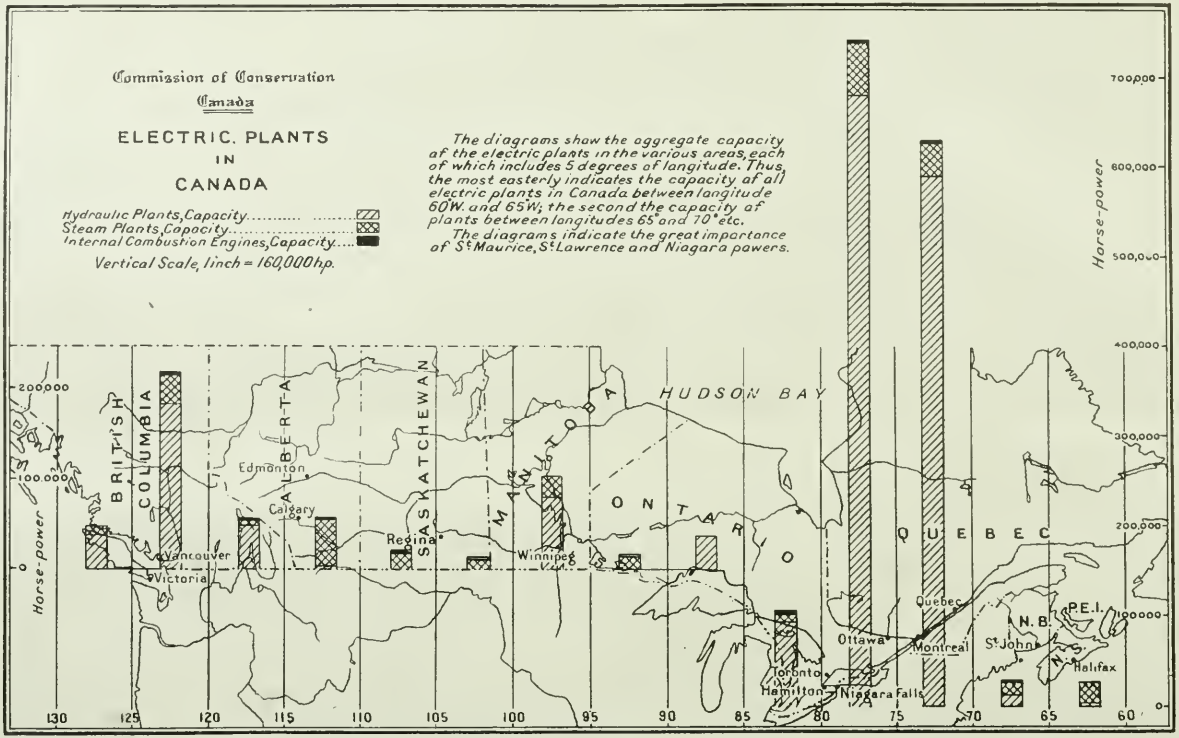
The city is to permit the company to carry on the city poles the electric power cables and telephone wires used by the company in the operation and dispatch of cars upon their system outside the city limits, at a specific annual rental. After the acquisition of the Toronto Railway Company's property by the city, the power cables are to be removed, but the city is to continue to carry the telephone wires.

The immediate effect of the acquisition of this portion of the Metropolitan Division will be the arrangement of plans for the double tracking of Yonge Street to the city limits and the installation of a complete sewer system for North Toronto, followed by the permanent paving of the roadway.

The new arrangement has been carried out on behalf of the city by Works Commissioner Harris, Finance Commissioner Bradshaw and City Solicitor Johnson.

A Correction

Through a compositor's error a line was dropped out of an item, which appeared in our February 15th issue, regarding a contract awarded to the Canadian Westinghouse Company for the supply of two generators for the Hydro-electric Power Commission of Ontario, to be installed at Queenston. Instead of the item reading "each of these turbines has a capacity of 45,000 kv.a." it should have read "each of these turbines has a capacity of 52,500 h.p. and each generator a capacity of 45,000 kv.a."



Commission of Conservation
Canada

ELECTRIC. PLANTS
IN
CANADA

Hydraulic Plants, Capacity ▨
Steam Plants, Capacity ▩
Internal Combustion Engines, Capacity ■
Vertical Scale, 1 inch = 160,000 h.p.

The diagrams show the aggregate capacity of the electric plants in the various areas, each of which includes 5 degrees of longitude. Thus, the most easterly indicates the capacity of all electric plants in Canada between longitude 60°W. and 65°W.; the second the capacity of plants between longitudes 65° and 70° etc.

The diagrams indicate the great importance of St. Maurice, St. Lawrence and Niagara powers.

ELECTRIC PLANTS IN CANADA

The diagram herewith shows the aggregate capacity of the electric plants in the various areas, each of which includes 5 degrees of longitude. Thus, the most easterly indicates the capacity of all electric plants in Canada between longitude 60 W and 65 W; the second the capacity of plants between longitudes 65° and 70°, and so on.

The great importance of the St. Maurice, St. Lawrence and Niagara Rivers is particularly noticeable.

Industrial Illumination—Theory and Practice

A Brief Review of the Elementary Laws of Light, with Practical Suggestions for Better Lighting in Factory, Office and Warehouse

By Geo. K. McDougall, B.Sc.*

Adequate illumination for industrial enterprises, with the improved means for obtaining it, is being appreciated by many and every day more interest is being shown in this subject due to the distinct bearing it has on efficiency and welfare of employees.

With a view to promoting interest and discussion on the subject of illumination, this paper has been prepared. The subject matter contained herein is simply a collection of information, briefly covered, which may be found more fully taken up in textbooks and technical articles on illumination.

Before touching on the practical side, the fundamental laws of reflection and transmission of light will be briefly covered, to allow of the easier understanding of their application.

The common laws of reflection and transmission are well known and widely utilized by designers of lighting equipment, but unfortunately many mistakes are made in the application of such equipment by those who are not familiar with these laws.

Touching briefly first on the laws of reflection and transmission of light, we have:

1. The Law of Reflection. The angle of reflected light is equal to the angle of incident light.

2. The Law of Refraction. The sine of the angle of refraction of a light ray passing from one medium into another is equal to the sine of the angle of incidence multiplied by a factor which is determined by the relative refractive indices, or the relative optical densities of the two media.

The law of reflection is illustrated by Fig. 1 and the law of refraction by Fig. 2.

When we consider the result of a pencil of light rays, i.e., a collection of parallel light rays we may obtain results which appear quite different from those we would expect when applying these laws, due to differences between the different parts of the reflecting or refracting medium scattering the rays. Each individual ray, however, is following the regular laws in spite of the fact that, collectively, they are not.

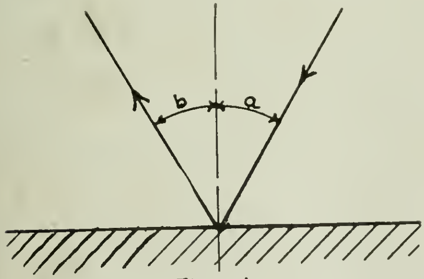


FIG. 1

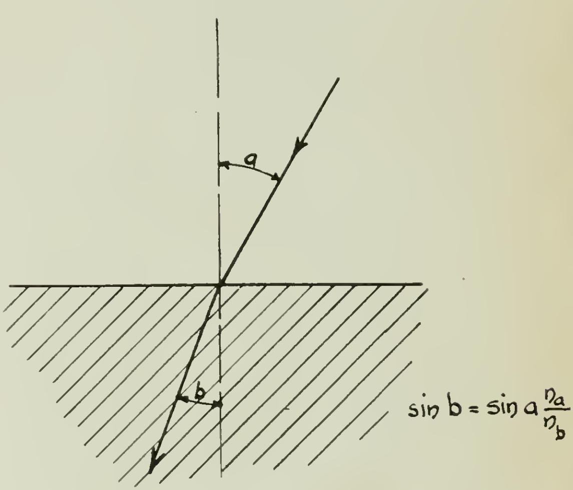
REFLECTION

This now brings us to the general laws of reflection and refraction of a collection, or pencil of light rays.

First considering the secondary laws of reflection, three in number:

1. The law or regular or specular reflection.
2. The law of spread reflection.
3. The law of diffuse reflection.

Illustrating these laws—Fig. 3 shows the operation of the law of regular or specular reflection. In this case the angle of incidence of the light rays is equal to their angle of reflection. This kind of reflection is obtained from mirrored glass, prismatic glass and polished metal surfaces.



$$\sin b = \sin a \frac{n_a}{n_b}$$

FIG. 2

REFRACTION.

Fig. 4 illustrates the law of spread reflection. Spread reflection is obtained from etched prismatic glass and from rough metallic surfaces. It is to be noted that in this kind of reflection that the medium intensity of the reflected light is in the same direction as in regular reflection, but a part of the light is scattered slightly out of this line, producing the effect of a spreading beam of light of the same general direction as in regular reflection.

Fig. 5 illustrates the law of diffuse reflection. In the case of diffuse reflection the maximum intensity of reflected light is always normal to the reflecting surface and the light is reflected through an angle of 180°. This holds over a large range in the angle of incidence. If a photometric curve is plotted of the light reflected from a small surface it will be found that the intensities are represented by a sphere, or considering one plane cutting the point of incidence, by a circle. This distribution of reflected light follows what is known as the cosine law, which is that the intensity of reflected light at any angle from the normal to the surface is proportional to the cosine of the angle.

Diffuse reflection as ordinarily obtained, is caused by reflection from particles beneath the surface. This will be better understood by referring to the magnified view in Fig. 5. The light rays penetrate the material and are reflected back and forth between the minute particles and finally emerge in all directions.

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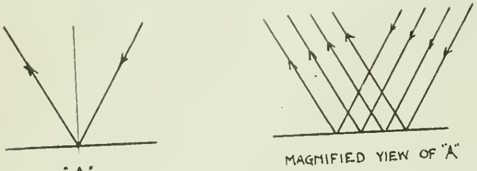
*Before the Montreal Branch E.I.C.

It may appear that diffuse reflection is obtained by surface reflection, but if the substance under consideration, which gives diffuse reflection, is examined, it will be found otherwise. Taking, for instance, a piece of matt surface paper or blotting paper, which is diffuse reflecting material, it would appear, at first thought, that the reflection of light is from the surface, but holding the paper up to a bright light it is found that it transmits light, which proves that the light is entering the material.



REGULAR REFLECTION

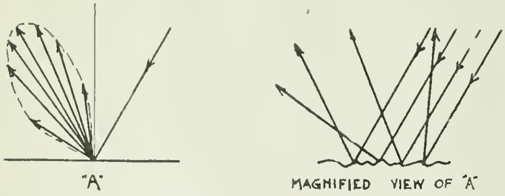
FIG. 3.

Examples of materials giving diffuse reflection are opal glass, porcelain enamel, paint enamel, also kalsomine and paint finishes commonly used for walls, ceilings and interior decoration.

The property of diffuse reflection of common interior finishes is a very valuable one from the point of view of interior lighting.

It is possible to obtain combinations of regular and diffuse, spread and diffuse, or regular and spread reflections from the same material. These combinations are illustrated in Fig. 6.

In Fig. 6A is represented the combination of regular and diffuse reflection. The regular component is surface reflection and the diffuse component is sub-surface reflection. This is one of the most important types of reflections met with in practice and is obtained from such materials as porcelain enamel finish, opal glass and paint enamel when the surface has a gloss finish. The component of regularly reflected light, though appearing large, is really comparatively small and unimportant and actually is rarely more than five per cent. of the total light reflected.



SPREAD REFLECTION

FIG. 4.

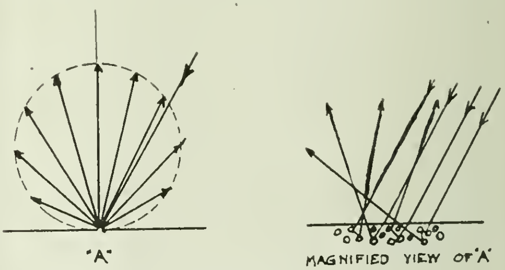
Fig. 6B illustrates the combination of spread and diffuse reflection which is obtained from materials such as porcelain enamel, or opal glass when the finish is rough.

Fig. 6C shows the combination of regular and spread reflection which is obtained by reflection from two surfaces of a material such as the inside and outside of a piece of glass when the outer surface is roughened. Crystal glass roughed outside gives this combination which, in practice, is unimportant as the materials giving it are not satisfactory as reflectors.

Considering the types of reflection from a practical standpoint it is seen that the most accurate control of light is obtained from materials giving regular or specular reflection such as mirrors or polished metal surfaces. This type of material is used in the manufacture of reflectors for searchilghts, headlights, etc., where accurate control is required. It is to be noted, however, that this material is not satisfactory for reflectors to be used in general illumination, due to streaks or striations of light resulting from the reproduction of the image of the light source on the illuminated surface. Mirror reflectors having corrugations should not be confused with the above as they give spread reflection.

Surfaces giving spread reflection, such as corrugated mirrors and aluminum paint finish are of great importance, and while less accurate in the control of light than those materials giving regular reflection, are sufficiently accurate for most practical requirements in commercial reflectors. With spread reflecting surfaces it is possible to design reflectors whose shape will give all the light distributions required for interior illumination purposes. Striations or streaks on the surface illuminated are eliminated by the use of spread reflecting material in reflectors.

The accurate control of light with diffuse reflecting materials such as porcelain enamel finish and opal glass is difficult. The general direction only of the light can be controlled and reflectors made of this material are only useful where a general downward distribution of light is required. A focussing distribution of light or other extreme distributions are impossible when a diffuse reflecting medium is used. It so happens, however, that the distributions most commonly used in commercial and home lighting fall within the range of those that can be obtained from diffuse reflecting materials.



DIFFUSE REFLECTION

FIG. 5.

The prismatic glass reflector belong to the type of reflector giving spread reflection, and when accurately designed will give a wide range of distributions with considerable accuracy. Fig. 7 is a cross-section of a portion of such a reflector. The light ray passes through the inner surface, where a small portion of it is reflected, the balance is regularly reflected twice from the outer surface and then passes back through the inner surface. Due to the several reflections, the inequalities in the glass cause the rays to be slightly spread from the direct path of regular reflection. This slight spreading has the advantage of eliminating striations without reducing the control of light, which is one of the important advantages of the prismatic reflector. It should be remembered that in order to get the results for which it was designed, a prismatic reflector should be used with the size lamp and lamp position called for by the manufacturer, otherwise a totally different distribution of light may result.

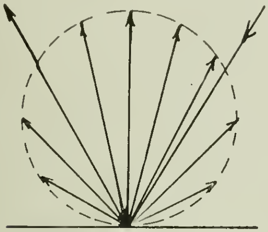
Summarizing the important uses of the different reflecting media it is observed that for the most accurate control of reflected light regular or specularly reflecting materials are used. Reflectors of this type are not satisfactory for general purposes of industrial illumination unless some provision is made to get rid of the striations produced.

Spread reflection allows of a fair control of light and materials having this characteristic are of great practical use for industrial reflectors. It is possible with spread reflecting surfaces to design shapes of reflectors giving the distributions most widely used in interior illumination.

Diffuse reflecting materials are difficult to control light with and are only useful where a general distribution of light is required.

Light Transmission

The primary law of reflection governs the path of a light ray passing through a material. This law was defined earlier in this paper. When a beam of light, however, passes through and emerges from a medium, the resultant emerging light follows laws very similar to the secondary laws of reflection. For brevity they will be enumerated and illustrated and illustrated in diagrams only, on account of their similarity to the laws of reflection.



COMBINATION OF REGULAR AND DIFFUSE REFLECTION

FIG. 6A.

These laws are:—

1. The law of Direct Transmission.
2. The law of Spread Transmission.
3. The law of Diffuse Transmission.

Direct Transmission. Figure 8A, is obtained with clear glass. The light passes through without change in direction except for a slight displacement at each surface due to refraction. A small portion of the light is reflected at both surfaces and absorbed in passing through the medium.

Spread Transmission. Figure 8B, is obtained from materials having an irregular surface such as clear frosted glass and clear glass having a wavy or crinkled surface. The general direction of the emerging light is in same direction as the incident light. The deviation being caused by refraction at the irregular surface.

Diffuse Transmission. Figure 8C, is obtained from opal glass and is caused by the refraction and reflection of the light in passing through the medium. The emerging light follows the cosine law.

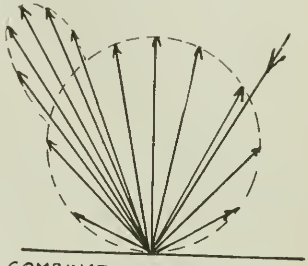
It is interesting to note the effect on appearance of globes having different light transmission properties.

With direct transmission the light source is visible. With spread transmission the light source is seen as a bright spot gradually fading in intensity towards the edges. With perfect diffuse transmission the light source is not distinguishable and the globe appears equally illuminated. It is possible to obtain numerous combinations of the different types of transmission analogous to those obtained in reflection, but they will not be touched upon here.

Natural Illumination

Natural daylight being the most important source of illumination available, it is well to consider briefly its control.

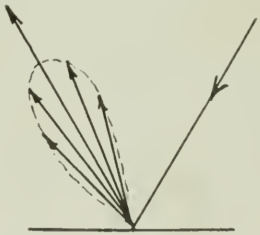
There are numerous different types of window or street glass on the market, and it is of interest to note their effect on the resultant illumination of a room. First in common use is clear glass, which has direct transmission, i.e., the direction of the light rays after passing through are in the same direction as originally. Between 10 and 20 per cent. of the incident light is reflected or absorbed. Objects can be clearly seen through it without material distortion.



COMBINATION OF SPREAD AND DIFFUSE REFLECTION

FIG. 6B.

Next come the clear sheet glasses having various degrees of spread transmission of light caused by irregular refraction due to their irregular surfaces. The greater the irregularities of surface, the greater the spread of the rays of light. In the use of this type of glass it is to be borne in mind that care must be used in the placing, especially, where it is exposed to the direct rays of the sun. Most people have experienced the discomfort of facing a window near the eye level, glazed with glass, on which the sun was shining, having a fairly large amount of spread transmission. The glass appears extremely bright, due to some of the sun's rays being deflected into the eyes. This property of deflecting some of the rays is extremely useful in increasing the illumination in the part of a room away from the window, but care should be taken to avoid producing a glaring condition.



COMBINATION OF REGULAR AND SPREAD REFLECTION

FIG. 6C.

The ability to see through glass having a spread transmission characteristic depends upon the amount of irregularity in the surface.

Glass having diffuse transmission, such as opal glass, is not often used to any great extent for window glass.

Prism glass is frequently used for bending light rays into a new direction where they will be more useful. In the use of prism glass, the angles of the prism must be accurately designed for the particular location, to obtain the results intended.

Artificial Illumination

From the standpoint of artificial illumination, it is important that the general laws of reflection and transmission be understood as applied to practical problems to enable their proper solution. These laws have been already covered in a general way.

The problems of artificial illumination for industrial purposes may be roughly divided into two general classes:— the lighting of offices and the lighting of workshops. Each one of these has its own particular problems.

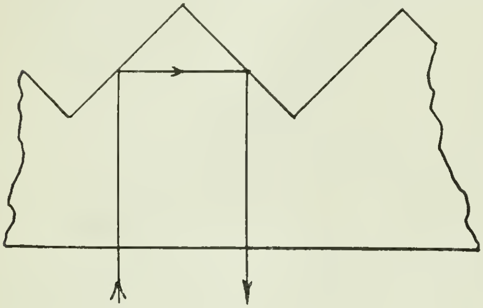


FIG. 7.

In general, good illumination should conform to the following requirements:—

(a) There should be an adequate amount of light coming from the proper direction for the easy performance of the work involved.

(b) Heavy contrasts should be avoided.

(c) Glare should be reduced to a minimum.

The Illuminating Engineering Society specify in their code, which has been adopted by law in numerous States of the U. S., gives the desirable intensity of artificial illumination for different classes of work as follows:

Storage, passageways, stairways and the like	0.25 to 0.5
Rough manufacturing and other like operations	1.25 to 2.5
Fine manufacturing and other operations of a like character	3.5 to 6.0
Special cases of fine work	10.0 to 15.0

The foot candle is the illumination produced by a source of 1 candle power at one foot distances. At 2 feet distance the illumination will be one-quarter foot candle as the inverse square law applies.

The smaller values in the table are minimum intensities, but it will be found, as a rule, that the higher values will be productive of the best results.

For daylight conditions, the code states that the figures in the above table should be increased three times for satisfactory conditions on account of the greater intensity of light required in the daytime, due to the physical condition of the eye.

The eye is so constructed that it adapts itself for different intensities of illumination. Out of self protection it adapts itself to the maximum intensity in the field, and it is quite posible, where there is a bright spot in the field, for the eye to be adjusted for this intensity and yet be attempting to see in a less illuminated area, with consequent reduction in powers of vision. This is a common fault in a great many of our old systems of illumination where unshaded lamps are employed. An exaggerated conception of this condition of lighting is illustrated by the automobile headlight in the field of vision of the opposing driver.

Bright reflections from polished surfaces are also conducive of this condition. Heavy contrasts are produced when local areas are highly illuminated with reference to their surroundings. This condition obtains in the use of shaded lamps close to the work without other general illumination in the room. The glancing from the work to the surroundings causes a large readjustment of the eye, which if continued in will cause eye fatigue and discomfort.

The use of tungsten lamps, particularly the gas-filled type, are productive of heavy contrasts. On account of the considerably higher efficiency of these new types of lamps, they have been universally replacing the older types without, in most cases, the necessary change in the equipment.

Modern incandescent lamp filaments must be kept out of the normal field of vision if glare is to be kept down. This can be managed if they are used in proper reflectors and mounted sufficiently high. The consciousness of a bright light source disappears if it is mounted sufficiently high to subtend at the eye an angle of not less than 25 to 30 degress with the normal.

Uniformity of illumination has a great bearing upon the ease with which work can be done. This question of uniformity is one which is of great consequence in the design of a lighting system. The direction of the light rays is also very important. There are certain classes of work in which shadows play a great part in assisting to see properly and bring out the proper form and perspective, while in others the elimination of shadows is an advantage. By shadow is not meant dense shade, but simply a grading of the illumination on different parts which is necessary to bring out form or shape without reducing the ability to see distinctly the parts less highly illuminated. In other words, work that requires the distinguishing of length, width and thickness, requires a certain amount of shadow, whereas that done on a plane surface, such as in office work, shadow is not a necessary adjunct.

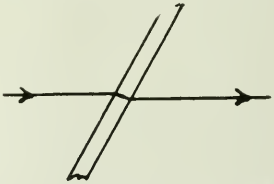

REGULAR TRANSMISSION

FIG. 8A.

Absolute uniformity of illumination is productive of monotony and, as a rule, should not be the aim of a designer.

The lighting out of doors on an overcast day creates a feeling of depression and lack of interest in one's surroundings, which can be attributed to a great extent to uniformity in the illumination. On the other hand, our interest in things is stimulated on a bright, sunshiny day, due to the added beauty and form of our surroundings caused by the high lights and shadows. It is worth noting, however, that even on a bright day out of doors contrasts between high light and shadow are never very great and seldom exceed ratios of twenty to one.

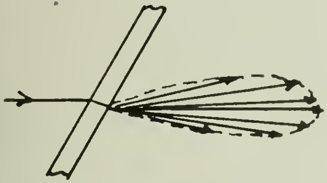
Glare is the term commonly used to describe the condition obtained when there is a brightness within the field of view of such excessive character as to cause discomfort, annoyance or interference with vision.

The reduction of glare, in lighting, to a minimum, should be kept in mind in the design of lighting systems. Glare is really a condition of intense contrast and may be caused by improperly shaded lamps in the visual field, viewed against a dark background, or reflections of light sources from polished surfaces.

General Types of Lighting.

There are three general types of lighting in use at the present time, namely: Direct lighting, semi-indirect and totally indirect.

In the first, the direct rays from the lamp reach the work. In semi-indirect, part of the light is diffused through a bowl or other shading and diffusing medium and part directed onto the ceiling and re-directed to the work. In totally indirect the light is all directed to the ceiling and re-directed onto the work. Each of these types of lighting has its particular field of usefulness. The first directs the greatest proportion of the light produced onto the work and is also the most productive of glare. Shadows are sharper and more apparent with direct lighting than with semi-indirect or totally indirect.



SPREAD TRANSMISSION

FIG. 8 B.

In semi-indirect lighting there are two components of light, one from the source diffused through the bowl and the other from the ceiling. The ratio of these two components has a great bearing on the resultant illumination, the shadows produced and the appearance of the fixture.

As a rule, the bowl of a semi-indirect fixture should not transmit too much light, otherwise it will appear very bright and where installed in large rooms with relatively low ceilings, will be a cause of glare, also reflections of it on polished surfaces and glossy papers will be troublesome. Where large light sources are used in a semi-indirect fixture, the size of the bowl should be in proportion to the size and intensity of the light source.

One of the most common faults of this type of lighting fixture is the over-brightness of the inverted bowl.

Totally indirect lighting fixtures consist of an opaque reflector distributing the light onto the ceiling from which it is redirected into the room. This type of lighting produces the most uniform illumination and freedom from shadows.

As stated before, interior finishes and kalsomine paints are diffusely reflecting media and the maximum intensity of the reflected light is normal to the surface. The advantage of this is at once seen when light falls on the ceiling. In the case of walls, however, it is somewhat of a disadvantage as a considerable proportion of the light is reflected in directions which are not useful.

In order of efficiency of utilization of the light produced, direct lighting comes first, then semi-indirect and last, totally indirect. In considering efficiency of a lighting system, however, the fact should not be overlooked that it is the overall efficiency of the carrying out of an operation that must be considered and that the lighting is simply one item of cost of production which is always a small proportion of the total cost.

Much interesting research work has been done in the last year or two on the effect of illumination on output. At thte present time extensive experiments are being carried out by the Illuminating Engineering Department of the Commonwealth Edison Co., of Chicago, along these lines (Transactions Illuminating Engineering Society paper by Wm. A. Durgin, "Productive Intensities," November, 1918).

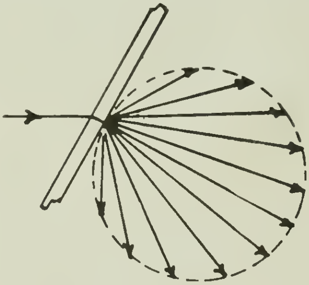
The data they have obtained is most vauable as they have conclusively shown that the production of departments of large manufacturing plants has been increased by at least 15 per cent. and in some cases by as much as 100 per cent., by improved illumination. When the cost of bringing about the increase in production is considered it appears as negligible compared with the result.

Analyzing the reasons for increased production under better illumination it is found that more work is turned out by operatives due to reduction of spoilage, improved accuracy, better supervision, reduced eye-strain and brighter and more cheerful surroundings.

Illumination has also a very great influence on accidents and there is cause for assuming that probably 20 per cent. of industrial accidents are attributable to lighting. The remedy for this is easy to apply and with the cry of "safety first" being continually heard, there is no reason why lighting should not be included amongst the mechanical safeguards against accident. The proper lighting of a danger point is an effectual way of pointing it out.

In spite of the large amount of advice and data that is appearing every day in technical journals, it is surprising to find that literally thousands of plants are paying very little attention to this advice, when it may mean thousands of dollars in their output with comparatively small expenditure involved for the necessary improvement.

The importance of illumination and its effect on general welfare may be further realized when it is known that many of the United States have adopted codes of illumination for industrial establishments, giving extensive powers to inspection boards over systems of illumination, and allows them to compel the installation of adequate systems. In our own country, with its short winter days, a large proportion of work is carried out under artificial illumination and, consequently, the possibility for increasing our efficiency is great.



DIFFUSE TRANSMISSION

FIG. 8C.

Mr. R. F. Crosbie, assistant superintendent at the Regina electric power plant, died recently following an attack of Spanish influenza.

Electrical Equipment of the Dominion Iron & Steel Co., Ltd., at Sydney, N. S.

From small beginnings over twenty years ago, the Dominion Iron & Steel Co. has developed a large steel mill, making various products in Sydney, Nova Scotia.

The plant is situated on salt water, and iron ore comes from Newfoundland by steamers direct, unloading on the piers shown in the extreme left of the cut.

The process of manufacture of various finished products continues towards the right (Fig. 1), the finished articles consisting of steel rails, wire rods, merchant bars, wire nails, together with pig iron, steel ingots, blooms and billetts.

As an indication of the size of the plant, let it be said that during the past year there was turned out the following gross tons: Pig iron, 289,900; steel ingots, 332,000; blooms and billetts for sale, 69,000; rails, 114,350; wire rods for sale, 47,500; merchant bars, 850; wire nails, 7,300.

The vast majority of the plant is electrically driven. The main rolls of the rail mill are as yet steam driven, but these will shortly be converted to electric drive. Electric locomotives are used in handling coke at the coke ovens, and practically all of the overhead cranes in the plant are electrically driven.

For variable speed work, such as cranes, hoists, etc., 220 volts, direct current is used, and generally totally enclosed mill type motors with steel frames.

For constant speed work, 550 volt, 3 phase, 60 cycle induction motors are used, generally of the squirrel cage type, but in larger sizes, slip ring motors have been used for driving turbine pumps, etc., where it is necessary to decrease the starting current.

The generating voltage has been up to the present, a.c., 2,300 volts, 3 phase, 60 cycles, although a change is about to be made, and with the latest units installed, the turbines will be wound for 6,600 volts, 3 phase. The new power house being situated at the extreme end of the plant, and some of those installations which consume the largest amount of power being situated nearer the other end, the higher voltage is advisable. To transmit power to the fresh water pumping station, situated some five miles away, high voltage is also needed.

The transmissions to the various parts of the plant are altogether overhead, on wooden or steel pole construction.

The original power house installation made about twenty years ago, consisted of two 250 volt, direct current generators. About five years later there was added two 600 kw., 150 revolutions, 2,300 volt, 3 phase, 60 cycle generators, direct connected to reciprocating steam engines. This plant was situated at what was called No. 1 power house, to the left of the cut shown below near the blast furnaces.

When further power was required about the year 1910, there was installed, near the rail mill (Fig. 1), two Ratteau exhaust turbines, each 2,000 k.w., 2,200 volts. These turbines were supposed to use exhaust steam coming from the various auxiliaries in the mill and were installed in a new power house called No. 2, near the rail mill, and to give uniform flow of exhaust steam, Ratteau accumulators were installed near them. These turbines also have means of introducing live steam when necessary, to carry over where there is not sufficient exhaust steam coming from the main roll engines, and other exhaust steam producers of the plant.

To operate the electrical auxiliaries of this plant, such as the condensing and circulating pumps, there was installed in 1917, a 500 kw., 2,300 volt Curtis turbo-generator, and any troubles on the large exhaust turbines then would effect the continuous supply of water, etc., for the power house auxiliaries.

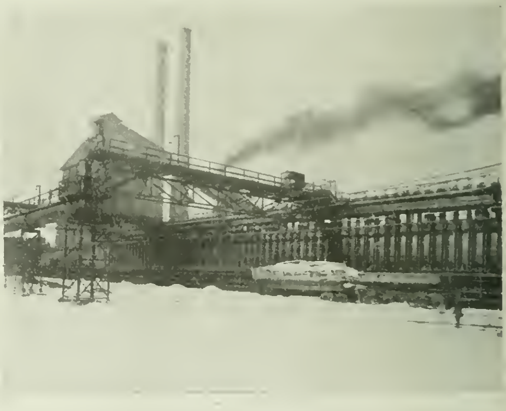


Fig. 2—New Coke Ovens, Sydney, C.B.

Equipment of No. 3 Power House

With the establishment of the new plate mill and other extensions, further power house equipment became a necessity. No. 3 power house is being built near the blast furnaces, and will take steam at 160 lbs. gauge, with 125 degrees F. superheat, this steam being generated by the blast furnace gas. In this No. 3 power house, there will be, at the outset, one 5,000 kw., 6, 600 volt, 3 phase, 60 cycle Curtis turbine; one 5,000 kw., 6, 600 volt, 3 phase, 60 cycle Curtis turbine; one 3,000 kw., 2,300 volt similar turbine; and one 500 kw. 2,300 volt turbine. A 28 inch vacuum will be obtained gen-

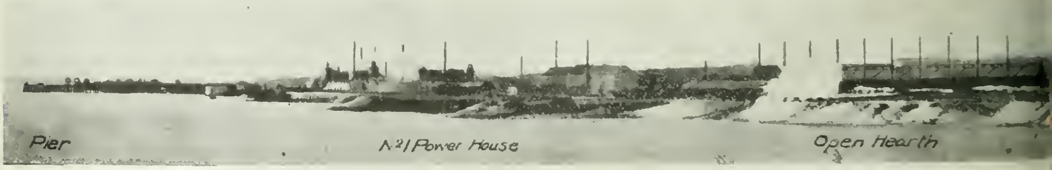


Fig. 1—General View, Dominion Iron & Steel Company's Plant, Sydney, C

erally through surface condensers taking salt water from the harbor.

The final capacity of this No. 3 power house will be something over 20,000 kw. There will be two complete sets of bus bars, one for 2,300, the other for 6,600 volts; these bus bars being tied together by three 1,000 k.w. transformers.

On the lower voltage, solenoid operated switches will be used. On the 6,600 volts, type H3 motor operated switches will be used. Bus bars, etc. will be mounted in cells for the higher voltage, while pipe frame construction will be used on the lower voltage. As the amount of power which can be concentrated on the 2,300 volt buses is limited as indicated above, the reason for this design is apparent. Storage battetry will be used for switch control.

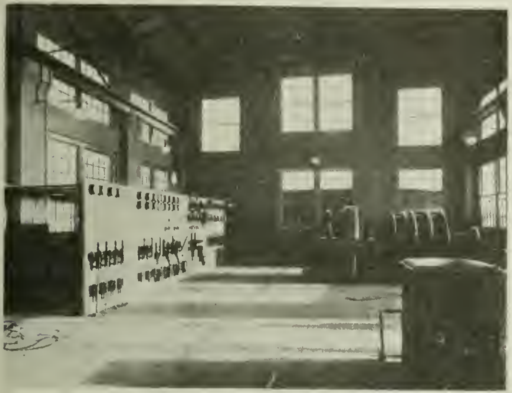


Fig. 3—Interior Coke Oven Sub-station, Sydney, C.B.

The switchboard panels and lightening arrester equipment will be on the same level as the turbines. The oil switches, both solenoid operated and motor operated on the floor above. Transformers will be on the same level as the turbines.

The exciter equipment for this power house will consist, at the outset, of two 100 kw., steam driven turbo-generators. There will also be provided a spare motor driven exciter, but the regular exciting current will be supplied by the steam turbines, and short circuits or other electrical troubles on the feeders will not cause trouble on the exciters.

There is a decided advantage in separate steam driven exciters over exciters direct connected to the main turbines, or motor driven exciters.

The main rolls, those in the rail mill, have heretofore been driven by reciprocating steam engine, the exhaust from which was passed on to the exhaust turbines mentioned before. These rolls will be electrified, and driven by a motor of approximately 3,000 h.p., and if direct connected, the speed will be 82 r.p.m. If a gear is introduced between the rolls and the motor, the speed of the motor will be correspondingly increased, which will improve the power-factor, but there will be a considerably increased expense for gearing, etc., and considerably more room to be taken with the foundations, etc., with the geared arrangement. The voltage of this motor will likely be 6,600 volts.

Practically all of the auxiliaries in the rail mill are motor driven through M.D. (mill type) motors, generally with drum control, although contactor control is used to a limited extent.

New Plate Mill

A new plate mill is being constructed to roll 110 inch ship's plates. This building will cover about 650,000 square feet, and the main rolls will be driven by 4,000 h.p., 6,600 volt motor, 82 r.p.m. The total weight of this motor and its flywheel will be about 330 tons (660,000 lbs.). Motor will be of the slip ring type, with a small percentage of resistance permanently introduced into the secondary circuit, so that flywheel may deliver power to the rolls when the load comes on. The control equipment will be of the automatic contactor type with hand control for acceleration, also plugging points to bring the motor to rest in reasonable time, in spite of the great inertia of the moving mass.

All of the auxiliaries of this plate mill will be electrically driven. The electrical equipment will be of the most modern design. Contactor control being very largely used, both on the cranes and on the auxiliary motors.

Fig. 4—New Blast Furnace, Sydney, C.B.

About 200 motors of various kinds and sizes will be required for the plate mill.

The nail mill is already electrically driven in most cases by constant speed induction motors, a large number of chain drives being used to prevent the vibration coming from the machines in the mill re-acting on the motors.

The coke oven plant is driven largely by M. D. (mill type) motors, while electric locomotives, 20 ton capacity, are used to haul cars of coke, etc., near the coking plant.

The question of the use of gas engines as prime movers was thoroughly discussed and it was decided that on account

anufacture from left to right. Vast majority of plant is electrically driven.

of the heat balance on this plant, that steam turbo-generators were more advisable, and it is hoped to adopt a 5,000 kw. unit as the standard size, this being chosen largely on account of the economies available through its use. The first turbine of this size is now on order, and will be in operation very likely the fall of 1919. The choice of steam turbines or gas engines involves a number of points in Canada that are not involved in the United States. Reference here must be made to the highly refractory character of the iron ore the high amount of sulphur in most of the Sydney coals, and the fact that gas engines are not manufactured in Canada as they are in the United States. While there has been some debate in the United States as to the best prime mover for steel plants, investigation has shown that as far as the Sydney plant is concerned, the choice of steam turbines is a wise one.

Interesting Motor Applications

There will be a number of interesting applications of electricity at this plant, particularly in the new plate mill in the handling of the plates and the rolls. In the older parts of the plant the use of M. D. mill motors has proven most satisfactory, the loss of production being very much decreased by the use of such high grade equipment. This is especially true when the atmospheric conditions at Sydney are taken into account, there being a combination of salt sea atmosphere with sulphurous gases from the coking and other processes.

Direct current is obtained now largely from motor-generator sets, and there will shortly be installed for this purpose, two 1,000 kw. sets, using synchronous motor drive. This will give power factor correction, which is required on account of slow speed of number of the large motors. Smaller motor generator sets, such as 500 kw. and 750 kw. size are used throughout the plant in sub-stations, which are more or less standardized.

Core type transformers are preferred in this plant, and generally these are self-oiled cooled. Fresh water is not usually obtainable in many parts of the plant for water cooling.

Fresh water supply is obtained from Grand Lake, situated some four miles from the steel plant, with motor driven pumps, many of the larger pumping installations, of course, handling salt water from the harbor.

A further extension of rolls driven by electric motors is contemplated, and the Sydney plant will certainly be in the forefront as far as the application of electricity to steel manufacture is concerned.

The low pressure steam turbines in No. 2 power house are of Ratteau design, the switchboard in that power house being of British Westinghouse manufacture. Most of the equipment in that power house was made in England.

No. 3 power house, which will contain approximately 20,000 kilowatts, will practically all be supplied by the Canadian General Electric Co., whose motors, both mill type and induction type, are standardized throughout the plant.

The large transformers throughout are generally Westinghouse or Canadian General Electric Company's manufacture. As the low pressure steam turbine installation was manufactured mostly in England, a number of English machines are in that plant.

Montreal Electric Club

"Thought as Applied to Business" was the subject of a talk by the Hon. F. Carrel, of Quebec, at the Montreal electrical luncheon on Feb. 19. He expressed the opinion that few business men gave sufficient thought to the big questions of the day, either political or municipal, and yet they complained if things went wrong or if taxes were raised. A change, he added, had come upon millions of people as the result of the war, and a more communistic spirit had been developed. The claims of labour would have to be carefully considered; the evasion of this question would certainly lead to discord, which would be injurious to the country. In connection with the better spirit which had been awakened in some directions, Mr. Carrel mentioned that one large Canadian company proposed to erect standardised workmens' dwellings, the payment of which would be met from a bonus of 10 per cent. given to the workmen, who would thus soon become owners of their houses.

The speaker insisted that Canadians should develop their natural resources, and thus establish industries which would not depend upon foreign supplies of material. In this way we could build up an export trade on specialised lines. The Government should assist propaganda work to make Canada better known in the States and South America. He advocated the Government guaranteeing the bonds of companies started on sound lines for developing Canadian resources, and instanced a large water power in Quebec which could be developed under such conditions.

Toronto Branch A. I. E. E.

The Toronto branch of the American Institute of Electrical Engineers held a very successful meeting in the Engineers' Club rooms on Friday evening, February 21, when Mr. Frank R. Ewart, B.A.Sc., Consulting Industrial Engineer of Toronto, read a most interesting paper on "The Business Relations of the Engineer." An interesting discussion followed, in which it was evident throughout that a very great deal of good could result from an interchange of ideas among men who were honestly desirous of fair dealing. The discussion covered the relation of the engineer in private practice to the large corporations having their own engineering departments; the relation of the engineer to the contractor, to the architect and to the owner. Some fine ethical points were brought out and insisted upon by Mr. Ewart.

The next meeting of the Club will be held on March 7 to discuss in a broad way the status of the branches of the American Institute of Electrical Engineers in Canada and the advisability of forming a purely Canadian electrical engineering association, still maintaining, perhaps, affiliation with the United States society. Electrical engineers are urged to attend this meeting and come prepared to discuss the question so that it may be viewed from every angle.

Engineers' Club Officers

At the annual meeting of the Engineers' Club of Toronto, a number of electrical men were elected to the directorate. The complete list of officers follows:

President, J. R. W. Ambrose; 1st vice-president, Melville P. White; 2nd vice-president, Tracey D. LeMay; 3rd vice-president, J. B. Carswell; directors, William A. Bucke, A. B. Cooper, E. G. Hewson, Charles H. Heys, Arthur H. Hull, J. H. McKnight, Walter R. McRae, L. V. Rorke, James R. Wainwright, Major Ward Wright, T. S. Young; secretary-treasurer, R. B. Wolsey. Mr. L. V. Rorke is chairman of the Admission Committee; Mr. W. A. Bucke, chairman Finance Committee; Mr. T. S. Young, chairman House Committee; Mr. J. B. Carswell, chairman Library Committee. At the suggestion of the President-elect, a committee was appointed to advise returned members regarding available positions in the engineering field, and another committee on the welfare of the engineering profession.

The Weekly Bulletin of the Department of Trade and Commerce, in a recent issue, gives the following figures for electrical apparatus imported into Canada: 1916, $5,393,574; 1917, $9,818,793; 1918, $11,406,955.

Lieut.-Col. C. H. Mitchell, Well Known Consulting Engineer, Appointed Dean of Faculty of Applied Science and Engineering, University of Toronto

The announcement of the appointment of Lieut.-Col. Charles Hamilton Mitchell, C.E., D.S.O., C.M.G., C.B., as Dean of the Faculty of Applied Science and Engineering of the University of Toronto, will be received with universal approval in view of his outstanding war record, as well as the place he has established for himself in the engineering circles of Canada. As a widely-known consulting engineer, prior to the war, and, for the last four years, as a general staff officer, where his administrative ability has always won the highest praise, Lieut.-Col. Mitchell has attained an unsurpassed prominence, and his appointment to the Deanship of the largest engineering-training centre of the Dominion will meet with the hearty support of all who have the future advancement of the engineering profession at heart. Col. Col. Mitchell was born in Petrolia, Ont., in 1872, and graduated from the University of Toronto in 1892 with the degrees of B.A.Sc. and C.E. His appointment as assistant city engineer of Niagara Falls, N.Y., followed; from 1894 to 1900 he was city engineer of Niagara Falls, Ont., engaging also in private practice in hydraulic engineering and water power development throughout Ontario. From 1901 to 1905 he was engaged as principal assistant engineer of the Ontario Power Co., Niagara Falls, and during 1906 travelled in Europe studying hydro-electric power developments. Since 1906 he has been in consulting engineering practice in Toronto, in partnership with his brother, Percival H. Mitchell, E.E. Lieut.-Col. Mitchell's practice has been largely along the lines of hydro-electric power development, notably in the design and construction of plants throughout Ontario and the Canadian West. During 1909-10 he was engaged as consulting engineer to the Ontario Power Co. on the extensions, which doubled the capacity of the plant to 100,000 h.p. During 1911-12-13, he was consulting engineer to the Water Power Branch of the Department of the Interior, Ottawa, on water power and conservation in Western Canada. He has been consultant in many industrial undertakings and his opinion on various technical, legal and arbitration cases, has been greatly sought. As a writer he has been the author of "Aerial Mechanical Flying," 1896; "European Hydro-electric Power Development," 1907; "Aerial Navigation in Warfare," 1911; "Canadian Hydraulic Power Development"; "Electric Power in Canadian Industry"; as well as numerous shorter articles of technical, military, and mountaineering interest. He is a member of the Institution of Civil Engineers, London, England, a member of the Engineering Institute of Canada and the American Society of Civil Engineers. From 1901 to 1911 he was a member of the Civic Improvement Commission of Toronto, and from 1910 to 1912, vice-president of Toronto Civil Guild and president in 1914. Since 1913 he has been a member of the Board of Governors of the University of Toronto, for twelve years prior to that being a senator.

Lt.-Col. C. H. Mitchell

At the commencement of war Lt.-Col. Mitchell was a Major in the Corps of Guides and Divisional Intelligence Officer on the General Staff, Second Division, at Toronto. He was promoted to Lieut.-Col., General Staff Officer (Intelligence) with the First Canadian Division overseas. Subsequently he became General Staff Officer (Intelligence) to the Canadian Corps in France; General Staff Officer (Intelligence) Headquarters 2nd Army, B.E.F., in France; General Staff Officer (Intelligence) General Headquarters B. E. F. in Italy. Col. Mitchell's war awards include the following: Mentioned in despatches on six occasions; received the Distinguished Service Order, June, 1916; Companion of the Order of St. Michael and St. George, June, 1917; Officer of the French Legion of Honor, March, 1916; Officer of the Order of Leopold, Belgium, July, 1917; Croix de Guerre, Belgium, 1917; Companion of the Bath, 1918; Officer of the Crown of Italy, 1918, and the Italian Cross of War.

Lieut.-Col. Mitchell will continue his connection with the firm of C. H. & P. H. Mitchell, consulting and supervising engineers.

Electric Smelting of B.C. Ores

Dr. Arthur Stansfield, Professor of Metallurgy, McGill University, Montreal, has submitted a report to the Minister of Mines of the province of British Columbia, Hon. William Sloan, on a recent investigation into the feasibility of electric smelting of certain ores in that province. The report has not yet been made public, but it is understood that Dr. Stansfield reports favorably on the scheme and recommends that one or more of the best iron ore deposits be developed in order to make complete tests of the ore. At the same time he suggests the establishment of a plant for the production of charcoal from mill waste, the charcoal being required in the reduction of the ore. He also suggests an investigation into the latest electrical process for the reduction of ore and if this is found as satisfactory as he anticipates, that a reduction plant should be established at a point conveniently located to the ore deposits, the charcoal plant and, for the supply of power, a waterfall that can be developed at a reasonable cost.

Hydro Radial Vote in Hamilton District

On March 15 the electors of Hamilton will vote on a by-law authorizing an agreement between the Hydro-electric Power Commission of Ontario and certain municipalities for the construction, equipment and operation of an electric railway from Port Credit to St. Catharines. Under this agreement a total amount of $11,360,363 debentures would be issued for deposit with the Commission, of which Hamilton becomes responsible for $5,869,286, the balance being divided among the city of St. Catharines and the villages, towns and townships along the way.

Electro-culture Experiments at Llantwit Vadre

An interesting series of experiments on the stimulation of plant growth has been carried on, near Pontypridd, during the last two years on the field of the Star-Delta Potato Club, which is connected with the South Wales Electrical Power Distribution Co., of which Mr. W. A. Chamen is the engineer and general manager. From a copy of the report on the results obtained The Electrical Review publishes the following particulars:

The field had an area of 2.07 acres (see Fig. 1), and the soil consisted of a typical heavy loam, approximately 70 per cent. clay and 30 per cent. sand. In 1916 the field had grown oats, but in 1917, when taken over about March, it had been two-thirds ploughed. This was completed, but no manure was used in 1917.

In March, 1918, 41 tons (20 tons per acre) of colliery manure was spread evenly over the field. In April the field was ploughed once lengthways, then harrowed and rolled. After this, 10 cwt. of 30 per cent. super-phosphate and 2½ cwt. of sulphate of ammonia was spread over the surface. It was proposed then to cross-plough, but owing to difficulty in obtaining a plough, and also to the planting season being due, the growers were compelled to open planting drills, and found only a fair tilth.

In 1917 potatoes were planted during the first week in May, and were lifted in the first week in October with the following results:

	Cwt. planted.	Cwt. lifted.	Ratio.
King Edward	2	4.46	2.25 to 1
Irish Up-to-Date	20	81.7	4.0 to 1
King's President	19	171.0	9.0 to 1
Arran Chief..	7.5	35.71	4.75 to 1
	48.5 cwt.	292.87 cwt.	6.0 to 1

In 1918 potatoes were planted in the first week in May, and lifted in the second and third weeks in October with the following results:—

	Cwt. planted.	Cwt. lifted.	Ratio.
Templar from Loch Leven.	48.6	370.4	7.6 to 1

For the purpose of the experiments, 400-volt., 25-cycle, single-phase current was stepped up by an oil-cooled, 10-kv.a. transformer to 32,000 volts, and rectified with a Delon type of rectifier, which held the voltage to 39,000 in dry weather and to 30,000 in the wettest weather. The apparatus gave no trouble at all, and held this voltage in the heaviest rain.

The area under electroculture was divided as follows:

	1917	1918
Electrified area	1.21 acres	1.096 acres
Control area	0.86 acres	0.977 acres
Total	2.07 acres	2.07 acres

In 1917 the network consisted of 5,850 yards of No. 24 S.W.G. galvanized steel wire. The wires were spaced 6 ft. apart, with cross wires arranged in the same way, so as to make a mesh 6 ft. square. These wires were supported from main copper carriers of No. 6 S.W.G. The network at first was supported on E.H.T. insulators about 6 ft. 6 in. from the ground; later, on August 14th, this distance was reduced to 5 ft.

In 1918, 1,860 yards of the same size of wire was used, but the wires were spaced 9 ft. apart, with no cross wires. The network was movable, and was kept as nearly as possible 2 ft. above the haulms.

The 1918 arrangement was at right angles to that of 1917.

The voltage was measured in 1917 by a Kelvin and White electrostatic volmeter, reading to a maximum of 100,000 volts. In 1918 it was measured by a sphere gap, previously calibrated. For measuring the current a Ferranti, d.c., 0-100-volt, moving-coil voltmeter (with the resistance cut out), calibrated as a milliammeter, was employed. This instrument, of course, gave the polarity as well as the value of the current. The synchronous motor being four-pole, by shifting the adjustable stationary arm of the rectifier a quarter revolution, the polarity could be reversed if necessary, but the network was kept positive. The ammeter was fixed on the negative.

In 1917, as stated already, the voltage varied from 39,000 volts in dry weather to 30,000 in wet weather. In 1918 it was 36,000 volts; and this did not vary 5 per cent. either way, the lower voltage being obtained during heavy rain and the higher during drier weather.

The current in 1917 varied from 2.5 milliamperes in dry weather to 4.0—7.0 in wet weather. In 1918 it varied from 0.35 in very dry weather to 0.8 during heavy rain, with an average of 0.5 during the normal weather prevalent in the district.

It was endeavored to keep the voltage constant during the treatment, and it is interesting to note the lower readings during 1918, which may be accounted for by the smaller amount of wire used as compared with the previous season, the ratio being 3:1. Further, the insulators used during 1918 provided a smaller leakage path.

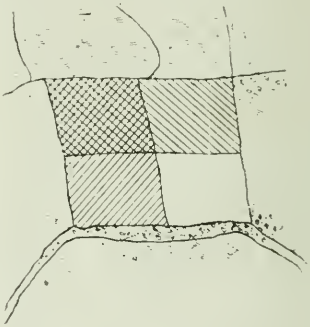


Fig. 1

Treatment was usually given between the hours of 6 and 9 in the morning and 7 and 10 in the evening:—

1917.		1918.
Commenced Aug. 10 ..	Morning, 118 hours.	June 22, 294 hrs.
Finished Oct. 1 ..	Evening, 164 hours.	Sept. 27, 294 hrs.
Total	282 hours	588 hrs.

The results of electroculture were as follows:

	1917. Tons.	1917. Tons per acre.	1918. Tons	1918. Tons per acre.
Electrified. . . .	9.1	7.5	10.3	9.46
Control	5.5	6.4	8.2	8.40
	Increase ..	17.2%	Increase ..	12.6%

As previously stated, the apparatus never failed and was successful throughout, although difficulty was expected in keeping the network charged during heavy rain. On dark nights it was easy to see the glowing network wires. In the rectifier hut grass grew extremely quickly through the rough flooring of old sleepers, especially under the voltmeter, and in the dark the tips of the blades could be seen glowing, but, after some days, these went a dark brown, evidently showing that the discharge was too intense. Insects, such as butterflies, etc., on many occasions were observed, and it was noticed that when flying under the network they kept very close to the ground, or else flew back away from the wires. Insects that happened to alight on the wires in the hut could be seen glowing in the dark, and in most cases after the current was shut off they were found to be dead.

It was noticed in both seasons that the potato haulms under the network kept green much longer than those on the control portion.

Although the percentage increase in 1918 was less than in the previous year, it is to be noted that the total yield was increased from 14.6 to 18.5 tons, and although the treatment during 1917 only lasted seven weeks, as compared with three months during 1918, the decrease might be explained by the smaller area of network wire in 1918; but it should also be noted that, owing to the network in 1918 being arranged at right angles to that of 1917 (see sketch), about one-quarter of the 1918 control portion had been under the network the previous year.

It was unfortunate that, owing to the weather being so wet during the gathering of the 1918 crop, it was not possible to weigh separately the potatoes taken from each quarter of the field.

Cost of Equipment.

Transformer of 10 kv.a. 400/120,000 v. .	£204	0	0
3-h.p. synchronous motor for rectifier....	55	0	0
	£259	0	0
Making rectifier arms, etc., approx....	£41	0	0
	£300	0	0

It is estimated that this equipment could easily deal with 100 to 150 acres.

Two-Acre Voltage Equipment.

Galvanized steel wire	£2	8	0
Supporting wire, steel, say	2	0	0
Sapling poles, insulators, say eight at 10s..	4	0	0
Labor, say..	4	0	0
	£12	8	0

A "Danger Notice" was kept at the gate of the field warning people of the high voltage, and this probably had a deterrent effect on prospective thieves, but did not prevent a big cart-horse breaking through the hedge during 1917, which afterwards received a shock, departing with a good portion of the network attached to it. The horse did not return, but we understand that it was undamaged. This year a sheep dog got under the network, and after receiving a shock through its tail, it departed very hurriedly, making loud noises, and also did not return. Our informants are not sure what ill-effects it received, but say they certainly knew its voice was in good order whilst it was within hearing!

In an adjoining field, in 1918, an experiment was made on a crop of oats, but owing to various difficulties it was not possible to carry it out thoroughly. The results seemed to point to an approximate increase of 35 per cent. in grain and an increase of 17 per cent. in straw.

Theo. P. Shonts, president of the Interboro Rapid Transit Company, which operates the subway and elevated lines in the boroughs of Manhattan and the Bronx, New York, states, in a letter to the municipal government, that unless an eight-cent fare is granted the company faces bankruptcy.

Historical Review of Steam Turbine Progress

The Westinghouse Electric and Manufacturing Company has just issued their Circular 1591, entiled "An Historical Review of Steam Turbine Progress." This publication was written by Mr. Francis Hodgkinson, whose commercial and engineering knowledge of the steam turbine is perhaps as broad as that of any man in America. The circular is a reprint of an article which appeared serially and is now gathered together in one publication with the intention of becoming a handbook on steam turbine progress. The early history of steam turbine engineering is gone into and the earlier machines installed in America are illustrated. From 1899 until 1917, each year's development is properly illustrated with views of all the different types of impulse and reaction turbines and the construction of blading, valve chamber, governor, throttle valve, coupling and oil cooler are shown in detail. This publication should be a valuable addition to designing and consulting engineers. It is being used extensively, we understand, in the Government training classes for junior engineers on steam engineering work.

And Toronto's Mayor, Too

Shoes are up, beef is up,
  Bread is out of sight;
Plumber puts his prices up—
  People say "all right."

Ink is up, paper up,
  "Comics" add a half;
Papers boost their prices up—
  Patrons stand the gaff.

Rails are up, coal is up,
  Crews demand more wages;
Trolley people ask relief—
  Papers froth with rage.

O-B Bulletin.

The International Paper Company, New York, have completed plans for the development of the Rapides des Forges, Three Rivers, Que., in connection with proposed newsprint and pulp mills to be erected by the company at Three Rivers. The plan of the hydro-electric development includes seven units each of 7,500 h.p. part of the power being available for the purpose of other manufacturers. The directors of the company have not yet come to a final decision as to the carrying out of the scheme.

The Bill of the Levis County Railway Co. (recently reorganized) has been before the Railway Committee of the Quebec Legislature. The company obtained franchises for 20 years from the municipalities of Levis, St. Romauld, Bienville, and Lauzon, but they were not ratified by the electros and the requisite legislative authority is now sought. The rates are to be 25c for six and four tickets, with a cash fare of 10c. This was protested against, but the committee left the question to the Quebec Utilities Commission to be decided on should there be an appeal to that body. Tickets, placards, etc., are to be in the two languages, and the cars of the one man control type.

At the annual meeting of the Ottawa Branch of the Engineering Institute of Canada, held in Ottawa, on January 9th, the following officers were elected for the calendar year 1919: R. deB. Corriveau, chairman; J. B. Challies, Secretary; and as members of the Managing Commitee, Messrs. A. F. Macallum, C. N. Monsarrat, J. Blizard and G. B. Dodge.

The Contractor-Dealer

The Dawn of a New Era in Electrical Merchandising—Large Manufacturing and Jobbing Company Place Expert at Disposal of the Members of the Contractor-Dealers' Association in Toronto

There are already signs that Mr. Goodwin's visit to Toronto, as reported in our last issue, is nearing fruit. At that time one of his recommendations was the employment of a skilled "merchandiser" who should make the rounds of the electric stores, offering suggestions, giving advice, answering questions and, if necessary, taking charge of this or that store for a day or two at a time. Whether or not as a direct result of this visit, it is very satisfactory to note that the Canadian General Electric Company, looking to the general development of the trade, has already named an expert window dresser and retail sales organizer, whose services are to be placed at the disposal of the electric stores without charge. It is understood the scheme will be tried out first in Toronto and then gradually extended as its usefulness is better understood and its results proven.

We cannot but feel that this is a great big step in the right direction. No doubt this one company will feel that it is not called upon to carry all the load which will automatically shift, in all probability, to the shoulders of the whole electrical manufacturers' association. Indeed it would seem to be an expense that should best be borne by the manufacturers, jobbers and central stations operating together, since each of these elements in the trade is vitally interested in boosting the sales of electrical equipment and, therefore, in seeing that the methods of merchandising adopted by the contractor-dealers and others handling this equipment, are of the most modern.

The Announcement

The Canadian General Electric Company have sent out the following announcement:

Toronto, February 25, 1919.

Toronto Members Ontario Association of Electrical Contractors and dealers:—

Re: Window Dressing and Show Window Displays

Dear Sirs,—When Mr. Goodwin was here in Toronto he commented rather severely on the general appearance of the show windows and display rooms of the electrical dealers and contractors.

We all appreciate that the show window, if properly used, is an excellent salesman, and realizing that the average dealer with his many duties, cannot keep in close touch with the most up-to-date methods of display, etc., we have decided to inaugurate a new service (confined for the time being to Toronto members) in that we will offer the services of a special man to advise you of the best methods of dressing your windows, and arranging your showroom displays, and if necessary he will spend some time with you in arranging such displays.

Mr. Pollock, who will undertake this work, has had a great deal of experience in window dressing and displays, and we feel sure that you will find his suggestions and assistance of value. If you care to partake of this service kindly communicate with Mr. H. E. Pollock of our Sales Department and he will visit your premises as soon as possible.

Yours very truly,
Canadian General Electric Company Limited.
A. S. Edgar,
Supply Sales Inspector.

Hamilton Dealers Organize

On February 17 the electrical contractors and dealers of Hamilton had a very successful organization meeting in the Royal Connaught Hotel. Eighteen members submitted their applications and paid their fees. A constitution was drawn up and adopted, the name of the new association determined upon being the Hamilton District Electrical Association. The following officers were elected: President, Mr. V. K. Stalford; vice-president, Mr. C. W. Chadwick; secretary, Mr. J. Culley; treasurer, Mr. Geo. Lowe; councillors, Messrs. W. C. Reid, W. Jack and L. H. Lander. It is proposed to hold luncheons periodically and have speakers address the members on timely subjects.

TO ALL ELECTRICAL MEN IN WESTERN CANADA

Manufacturers, Dealers, Central Station Men, Etc., Etc.,

TAKE PRELIMINARY NOTICE

Under the auspices of the B. C. Association of Electrical Contractors and Dealers,

A GIGANTIC ELECTRICAL CONVENTION

will be held in the City of Vancouver on May 26th and 27th next.

Chief speakers will be Samuel A. Chase, Special Representative Westinghouse Electric & Mfg. Co., and in all probability W. L. Goodwin, Author of the Goodwin Plan.

Every electrical man everywhere is cordially invited to join in this monster electrical gathering. Wives are also specially invited.

In order to get on the mailing list drop a card to the Secretary, 406 Yorkshire Bldg., Vancouver, B. C.

Messrs. E. J. Philip & Sons have opened offices as consulting engineers in the Hamilton Trust Bldg., Toronto. Mr. E. J. Philip the senior member of the firm, has had an extensive engineering experience. He was for seven years manager of the gas, electric light and street railway systems at Kitchener, Ont., and four years manager of the gas, electric light and water systems at Brockville, Ont. He then became engaged in Government work, and has recently returned from Porto Rico, where he was emergency engineer in connection with the waterworks and filtration plants.

Price Differentiation on a Basis of Quantity and Service

By Mr. John J. Gibson[*]

The quantity principle of price differentiation is growing in favor because it is fundamentally right, and I shall not enumerate the reasons why, for they are known to you. But the application of the quantity principle may be made in several ways, and of these there are two which differ widely. One is to grade a buyer according to his potential buying power, and the other is to let him grade himself by the actual amount he buys at the time of each purchase. The first way includes the familiar "annual purchases" plan, with or without rebates. The simplest and best known form of the second is that of the "standard package."

These things are all so well known to you that I need not expatiate on them but need only mention them to set the stage for what I want to say about them. Making prices for consumers on a quantity basis involves no difficulty, but in the resale field a new element enters the case, and one that vitally interests you and every other resale factor in the industry. Compensation to a jobber or dealer for service rendered can be paid in only one practical way, and that is in the form of a discount or commission on the goods resold.

We need, therefore, to apply two discounts to get at what a resale factor should buy at, or, in reality, a single discount made up of two parts—one representing quantity and the other service rendered.

Present practice (with few exceptions) is to make resale discounts without regard to quantity and, in some cases, without regard to service. It is the easiest way. Even when we all know that there are many kinds and degrees of service rendered a resale factor to a manufacturer, we see the same discounts given to concerns whose services differ widely in character, amount and cost. We see also the same discounts given to concerns who do varying amounts of business. Surely, the larger volume deserves due consideration.

Why cannot these things be measured? They can, but is it worth while?

Is anything worth while? No political economist ever has advocated the "laisser faire" principle. While the other extreme of rigid control is equally objectionable, there is no doubt of the good common sense which recognizes things as it finds them and endeavors to regulate the disturbing elements in any situation by reasonable methods. Unrestricted competition is destructive. Monopoly, or the absolute elimination of competition is equally evil. Competition so regulated as to be fair and to be conducted on clearly defined lines is the very healthiest state of affairs in business.

It is worth while for us to measure resale service and to determine the part quantity handled is to play in arriving at proper compensation for a resale factor.

Compensation for Service

My subject has to do with quantity, but it is inseparably tied up with service, so it is necessary for the moment to analyze service briefly. Let us take your work. You sell. You carry warehouse stocks. You bill and collect. You investigate credits and carry financial risks. You advertise and display goods. Your service compensation should be and is the greatest of any resale factor in our business. But, should one of you do less than all the acts of service just outlined, should he have as great a compensation as that which is paid for all? And again, if one of you sells one-fifth or one-tenth of the quantity in any one line, is he as valuable a distributor to the manufacturer of that line as another of you who sells five or ten times as much? Or, if one of you sells as much as another and does not render the full service, i.e., the other fellow carries stock and you do not, the other fellow advertises and you do not, or the other fellow sells without expensive help from the manufacturer while you do not, are you entitled to as good discounts as the other fellow? No. We all agree on this in theory, but in practice no difference is made. Just as in trade unions the poorest workman in a trade draws as big pay as the best, so in the electrical jobbing business the poorest jobber gets discounts as good as the best. The very fact that there is a present disposition to separate jobbers into two classes—jobbers and distributors—indicates that this truth is recognized by manufacturers, at least.

As a matter of fact, you do perform all of the forms of service with two exceptions. Let us dispose of the less important exception first. There are some things, poles for instance, which you sell on commission, doing no billing or collecting or taking no financial risk and having no warehouse expense. In the comparatively low commission sometimes accepted for such service you show your recognition of the service principles as a gauge of compensation. The other exception is more important and is vital to our argument. That lies in the case where you do not stock the goods but perform all the other forms of service. If one jobber stocks a line, should he get the same compensation as another who will not do so? Should not a part of your compensation be graded on the degree in which you render this warehousing service which is fundamentally the real function of a jobber? We start with the assumption of a basic service discount for all other service but warehousing.

Here is where quantity is in a sense a direct measure of service or at least a proportionate measure. This is indeed the most variable item of service in the electrical jobbing industry. A manufacturer can afford to give greater discounts to the jobber who stocks his goods and in proportion to the amount, the quantity or the single order governing price can be made an automatic regulator and one that would be just to both manufacturer and jobber. A quantity discount would give you an extra margin of gross profit which would justify your buying in stock quantities, and if you chose not to do so but chose to buy in hand to mouth quantities, or never pass the goods through your warehouse at all, such a schedule would not give you a margin of profit which you had not earned, the smaller quantities naturally bearing smaller discounts.

Is this not fair and should not dealers and contractors or others buy from you on the same basis?

Method of Measuring Quantity

Now as to the matter of measuring quantity. To use any other but a perfectly definite measure would be only to court trouble. Let us see, therefore, which of the two ways of measuring quantity is the more definite.

Potential annual distributing power as a basis of rating is a matter of judgment based on past records, or is an intelligent guess. Rebates provide the only guarantee of performance to meet promises. Regulation by rebates is expensive and not at all a simple matter to keep straight. The practical result of this plan is no differentiation at all. Evasion is too easy, particularly when the seller is weak. Absence of quantity differentiation in resale work throws a burden on the jobber which should not be his. If a dealer can buy one article for the same price as twenty the jobber he deals with must perforce bear the expense of filling orders for extremely small quantities with no extra price for the extra service, and no dealer will make his orders large under such circumstances. This is a simple illustration. The same principle applies when the figures are multiplied and the bill of goods is more complicated. Annual buying power of a dealer would be a poor way of determining his prices when no two jobbers could or would agree on that annual quantity.

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[*] Before Cleveland Convention of Electrical Supply Jobbers.

Now, let us take the other way—quantity on the single order governing price. It is definite. It cannot be the subject of a dispute at the time or later, non-cancellable orders only being considered. It gives the jobber the protection he needs against imposition in the way of small orders because it would put a price on such orders as would either compensate the jobber for the extra cost of handling or it would encourage the placing of larger orders in the right quantities.

Between the jobber and the manufacturer the case is the same. Quantity discounts properly calculated would regulate proper stocks and compensate both manufacturer and jobber for the expenses which vary with quantity. Naturally the principle would have to be in operation in all sales schedules—manufacturer or jobber, to dealer, to user, with basic service differentials between them, of course, to get the best and fairest results. The jobber could not be expected to fill small orders at low prices and replenish his stock in like amounts at high cost. Consistency is necessary here as in all things for success and satisfaction.

Quantity on the single order determining price is free from uncertainty. Doubt as to how a competitor rates a buyer or a dealer or a jobber, disappears if you are sure he can get no price but that which his single order entitles him to. And, indeed, under such circumstances sales schedules need never be kept secret. Why therefore, should not the electrical jobbing industry of the country be in favor of this principle? There is no reason. Many jobbers I have talked to admit this theory to be correct but hesitate for obvious reasons to try a plan not used by everyone in the business.

Such a plan would stimulate quantity, eliminate the low-priced small orders and stabilize the market by substituting a certain definite measure for one open to dispute and misinterpretation. These reasons should appeal to you.

Putting the Electric Shop in Order

Is your electric shop just as you would like it to be—location right, windows attractive, interior well planned, and organization smooth running? The Society for Electrical Development offers some splendid suggestions in their February "Sales Service," urging the contractor-dealer not to rest content until he has classified, analyzed and corrected every business weakness that comes to light. The suggestions take the form of questions, sort of heart-to-heart talks the dealer may have with himself, and run as follows:

About Your Business Location

1—(a) Is the value of your location being impaired or improved by the trend of residential and business development?

(b) Is trade taking a channel that leads into other sections or centres?

2.—(a) If it is being impaired, are you taking steps to offset that detriment?

(b) Have you attempted to anlyze why this is?

(c) Have you ever made a real analysis of trade-buying activities, to learn the "How, Why, When, Where" of your retail trade channels?

3—If your location is being made more valuable, are you taking full advantage of your added opportunities?

4—(a) Can your customers and prospects find you easily, or is it difficult for them to locate your place of business?

(b) Are you advertising your location to fix it firmly in customers' minds—doesn't it need it?

5—Have you checked up your competitors and other retailers to ascertain how they have studied the question of "location" and made the best of their opportunities?

About Your Display Windows and the Use You are Making of Them

1—(a) Could you improve your windows by altering them? If so would not the expense be more than justified by the increased effectiveness of your windows?

(b) Are they too small?

(c) Are they properly lighted?

(d) Do they display the goods to fullest advantage?

(e) Do they allow sufficient light within the store?

2—Do you just "throw" a few devices or supplies into your windows, "letting it go at that;" or do you plan your displays carefully and with due regard to the seasons?

3—Do you make a point of studying the "other fellow's windows" and profiting by the knowledge gained thereby?

4—Do you observe the first rule of all good window display practice—to change your trims at least once in every two weeks?

5—Do you study and use the monthly suggestions for displays reproduced in the Society's Sales Service? Do you make fullest use of the display material furnished by the manufacturers

6—Is the lighting of your windows a credit to your position in the Electrical Industry?

7—Do you keep the windows clean and spotless? Do you observe a regular schedule for cleaning them as well as changing trims?

8—Do you ever solicit the suggestion of women-folks, in making up your displays?

About The Interior Of Your Shop

1—Is the shop swept and dusted regularly, and are the appliances on display kept looking spic and span?

2—Is the lighting system such as to properly illuminate your goods as well as the store interior and show them off to the best advantage?

3—Are there ample Convenience Service Outlets available for use in demonstrating lamps and appliances of every character?

4—Are there samples of supplies and fixtures on display where they can be pointed to by those who chance not to know them by name and are, therefore, at a loss to make their wants known? And are these items so cataloged that you can locate your stock promptly?

5—Do you segregate your stock in one section of the shop or store, your fixtures in another, your appliances in another and heavier household devices in still another? Or is everything jumbled together?

6—Are the appliances equipped with price and cost-to-operate tags, such as those furnished by the Society?

7—Are seats available for the comfort of customers who may desire a demonstration of washers, cleaners, and so on?

8—Have you endeavored to impart to your shop a distinctive note, something unique in lighting, or arrangement, or color scheme, or customer's convenience—something, whatever it may be, that will make and retain a place for itself in the minds of your customers?

1—Are your business operations governed by a policy that can be expressed definitely and in so many words? Have you so expressed it, and do you refer to it for guidance? Or are you going along more or less blindly, deciding each thing as it comes up, instead of settling the conduct of routine of affairs once and for all by establishing principles and policies?

2—If you do have an established business policy, are you then conducting your business accordingly?

3—If you are not doing so what excuse can you offer yourself for not either changing your policy to conform to your business activities, or changing your activities to conform to your policy?

About Your Accounting And Cost Keeping

1—Is yours merely a hit-or-miss bookkeeping system, or do you maintain comprehensive cost accounting and cost finding systems?

2—Are you familiar with the recently completed "Standardized Cost Accounting Plan" as described in detail in the November issue of the Sales Service? Is your present system as complete and satisfactory in all respects as this?

3—Does your system enable you to keep accurate track of your overhead in all its details and to apportion it accurately in establishing prices for goods and for service? Are you sure, in other words, that you are figuring everything in the way of costs that should enter into a bill or the price of an appliance?

4—Are you sure that all your operations are a source of profit, or is it possible that a more accurate and searching cost-finding method would expose many leaks in your business that you are unaware of today?

5—Do you employ simplified estimate and proposal forms in soliciting business, and do you keep accurate records of all estimates and proposals submitted?

6—Does your system include the keeping of a perpetual inventory of goods and supplies in stock, and do you have an accurate method of keeping track of the amount of material sent out on a job, the amount used and the amount returned?

7—Does your accounting system afford you a daily or weekly understanding of the exact status of your business?

8—Can you prepare readily and in satisfactory form a statement of your business such as banks and credit managers require?

About Your Selling Methods And Your Selling Talent

1—Do all who sell for you understand that electrical appliances should be sold for what they will do, rather than for what they are—do they, in other words, sell the "idea" rather than the mere appliance itself?

2—When demonstrating an appliance, do they state the cost in cents-per-hour-to-operate? Or do they confuse the customer by talking "watts, amperes, ohms," and other "Greek" terms?

3—Are they able to state in simple, non-technical language the scope and character of service that each appliance performs, and show wherein and how the service of the appliance will satisfy the customer's needs?

4—Are they well grounded in the fundamentals of selling? How do you know that they are? Have you ever made it your business to find out? Have you ever supplied them with printed sales helps such as the S. E. D. booklets "How to Sell An Idea," or "Buying A Cause And Paying For Effect," and others published by manufacturers? Are they making improvement in their knowledge and practice of selling?

5—Do you ask the Society for specific assistance for helping your sales people improve their ability to sell?

6—Do you supply your sales people with the incentive of an assured increase in income in return for improvements in their selling methods and results? Could you improve your selling conditions by compensating your help on a different basis—for instance, an equitable profit-sharing basis, or an automatic increase in income in return for an increase in sales?

Do your sales people as well as yourself benefit by the selling suggestions and assistance by the Society and manufacturers?

Advertising

1—Do you set aside a definite sum, or a percentage of your gross business, to be spent for advertising? Or do you follow the haphazard practice of advertising only when it strikes your fancy to do so?

2—(a) Have you ever had your advertising policy and your advertising copy analyzed and criticized constructively by competent authorities?

(b) Are you satisfied that those things are as good as they well could be?

(c) Do you make use of the advertising suggestions and illustrations supplied by the Society?

3—Is the impression that one naturally would receive from reading your advertising in keeping with the impressions received when your store is visited? That is to say, if in your advertising you talk of service, prompt attention, courteous treatment, trustworthy advice regarding the selection of appliances, and so on, do you make good on those statements?

4—Do you keep a scrap-book of your advertisements to show when and where they appeared, and such items as their cost, the temperature and state of weather, the sales of the items mentioned in the advertisements? Do you then make a business of studying that information to discover how your advertising can best be improved?

5—Do you receive any helpful service from newspapers in your city? Do you look to them for help that they usually extend to their advertisers?

6—Do you study your fellow-dealers' advertising and endeavor to make your advertising superior?

General

1—(a) Have you ascertained what should be considered a fair "turnover" in your business and are you keeping up with that standard? Could it be bettered?

2—Have you any tried and tested plans for getting rid of dead stock?

3—(a) Have you ever analyzed the actual purchasing power of your community?

(b) Do you gauge your business by the estimated percentage of business you secure against what the figures say you should get, or are you content to judge the current year's business by the percentage of increase shown over that for the preceding year?

4—When things go wrong in your business do you hunt until you find the cause of the trouble, and then take steps to correct it? Or do you believe in "letting well enough alone?"

5—Each week do you reserve a period to dismiss from your mind routine matters and do some real constructive planning for the betterment of your business?

6—(a) Are you a member of the local and national trade organizations, and, if so, do you make use of the benefits and opportunities such membership affords?

(b) Are you a good "mixer" in a business sense in your community?

7—Are you making full and complete use of the Society's many facilities for helping you to effect improvements in your business? If not, why not do so for 1919?

Hardware Stores Handling Electrical Goods

Discussing the question of hardware stores handling electrical appliances, Mr. Edgar, Canadian General Electric Company, speaking before the Hardware Retailers' Convention, in Hamilton, recently, said:

"The question has been asked, time and time again—should the hardware store sell electrical merchandise? The electrical dealers answer 'no,' and the hardware dealer says 'we must.' And then both sides proceed with arguments and incidents to prove whatever they desire. As a matter of fact, both are wrong and both are right. It is true that some hardware dealers have carried on their electrical merchandising activities in a manner prejudicial to the electrical dealer's interests. It is also true that in many communities electrical merchandising would have become virtually stagnant if it were not for the aggressiveness of the central station and the hardware dealer.

"The whole matter, as it seems to me, simmers down to this—there is no valid reason why the hardware store should not merchandise electrical appliances and other supplies provided that they deliver with each piece of electrical merchandise sold, a certain amount of electrical knowledge. The electrical merchant has that knowledge and if the hardware man expects to compete with him, both he and his salesmen must acquire sufficient knowledge of electrical supplies to intelligently conduct the electrical end of his business. For instance, a hardware dealer sells a toaster. He tells the purchaser it can be operated for 2 cents a day, and the statement is believed. The purchaser takes his toaster home and places it in continuous operation to heat a small chicken coop, with the result that the following month his light bill is $32.00. Many instances might be quoted where electrical supplies are merchandised in this way by dealers unfamiliar with the appliances or the cost of operation, but if the hardware dealer would take some pains to inform himself and his salesmen, regarding the more staple electrical supplies, there is no doubt that the hardware dealer, with his advanced selling methods, would become a big factor in the distribution of the more staple electrical supplies.

"It would pay the hardware dealer to get in touch with the manufacturers of small motors and electrically operated devices used in the home. This is a time of great economy. There are many thousands of electrically driven labor saving devices being sold each year and this number is increasing in spite of the increased cost of living, due solely to the fact that they are reliable labor-savers. It will be found that the sale of each new appliance, rather than exhausting the field, creates additional customers by practical education. It is to be hoped that the hardware dealer who undertakes the selling of electrical merchandise will himself become thoroughly educated to the use and operation of the many staple lines which can be handled to advantage by the hardware dealer, as a correct knowledge of these lines is absolutely essential to assure the success of his merchandising efforts in this direction."

Even the Architect Sees Humor in This

The specification of the architect, so far as the electrical installation in buildings is concerned, has always been more or less a handicap to the electrical contractor and the following example, prepared we understand by an architect, would seem to indicate that they are at last beginning to realize the humor of the situation they themselves have created and maintained for so long. The title is: Specifications of wire-pulling in connection with a girl's residence in....

General Conditions

Objects.—As the primary object of the electrical installation is the amusement of the inmates, the workmen shall use all diligence in regaling the girls with gruesome stories of death by electrocution, whether by lightning, in the chair, by accident or for pleasure. They shall also give them a thorough knowledge of the theory of electricity and enable them to define offhand the difference between direct currents and Valencia raisins.

Board.—The board under which this work shall be done is composed of twenty-four members, each one of whom has a distinct, separate, and different idea as to how the work shall proceed. The contractor, under a heavy penalty, shall absolutely guarantee satisfaction to each individual member as well as to the board collectively. Failure to accomplish this will abrogate any liability whatever on the part of the architect as to the issuance of a final certificate.

Voting.—In the case of a tie-vote between any two, four, six, eight, ten of twenty members, the President shall have the casting vote as to how the work shall be done, after which the workmen will proceed to do it as they damn please.

Foreman.—The foreman shall not only provide heavy bonds, but shall also wear a chain and ball as a repressive measure against his inevitable desire to abduct, elope with, abscond with or otherwise to get away with the pretty secretary of the board.

Treasury.—The treasury will not be guarded. If it is not dishonestly robbed during the progress of the works it will sure be honestly robbed at the conclusion of the job, so in any event the till will be empty.

Soldering Irons.—Soldering irons may be used in connection with the work, but their use shall in no case be diverted to the curling of the girls' hair. Nothing but soft solder shall be used, and to facilitate the smooth running of the job it shall be handed to the matron in large quantities.

Switches.—Only one switch will be required and this shall remain in the hands of the matron for the chastisement of any girl who may attempt to electrify the workmen by flashes from her eyes.

Inspection.—The work, as usual, will be inspected by the Hydro, and if the building be burned down through faulty installation the inspector will require no further evidence that the work is defective, and may order its immediate removal.

Electric Club of Toronto

The Electric Club of Toronto held their usual weekly luncheons on February 14, 21 and 28. The speakers on the various occasions were: On February 14, James T. Gunn, whose topic was: "Labor's Relation to Reconstruction Problems." On the 21st, Professor C. A. Chant, of the University of Toronto, spoke on "Some Recent Developments in Astronomy," and on the 28th Captain Frank Johnson described some of his experiences in motor transport work in France. The attendance is very gratifying, running as high as 150. The paid-up membership to date is 180.

Admiral Jellicoe's Message

The primary cause of the shameful surrender of the German fleet was the loss of morale on the part of the personnel. This was brought about by the strangling effect of sea power on sea communications and the knowledge gained at Jutland that this power was irresistible. The significance of this to an Empire which is absolutely dependent on sea power for its communications is obvious. The lesson to the Empire is that we should never allow our sea power to be called into question. It is our Life Blood.

(Sgd) Jellicoe.

How I Increased My Sales 100 Per Cent

A short time ago I decided to try and increase my sales of electric washing machines.

First, I went very carefully over the list of "female help wanted" advertisements in the evening papers and from the names made four lists as follows:

(1) The housewife who wants a general servant and says nothing in her advertisement about "washing done out."

(2) The advertisements for washwomen for the well-to-do houses.

(3) The advertisements for washwomen for the salaried people.

(4) The advertisement for washwomen for the mechanics and artisans.

The addresses of the advertisers assisted me to locate and divide the classes. Promptly next morning I mailed freshly written letters of which the following models give the import of the idea. These letters showed a cut of the washing machine I handled and the wording varied with the class of customer to whom I was appealing.

To the First Class:

Dear Madam,—You advertised in last night's paper for a general servant. Is she to do the whole or any part of the the washing? If she is, there is one way you can keep her and keep her contented.

Have an Electric Washer installed before the prospective domestic arrives. Then before she can get one-half way through her list of the perquisites you must give her, the number of afternoons and evenings off, the Sunday privileges etc., phone to us and say: "Is that (insert your telephone number) speaking?" We answer "Yes." You say "All right, this is Mrs. (name) speaking; that will suit me very nicely."

Before the prospective maid has finished her just (?) demands, our demonstrator is entering (as pre-arranged) your back door, has slipped down to the laundry, is sitting on a chair reading the paper while the Electric Washer demonstrates to the prospective domestic, whom you presently lead in, that there is no work at all in washing.

You will be getting replies to that advertisement shortly after you get this letter. Hadn't you better phone us at once to "carry on?"

Yours for Better Service.

Suggested Letter for Fourth Class:

Dear Madam,—We notice by your advertisement in last night's (paper) that you are again without a domestic to do your washing. Believe me you cannot keep them unless you follow the path of least resistance.

We will be pleased to send you on trial an Electric Washer, or demonstrate same at our shop (give address). We guarantee the Electric Washer and Wringer does all the work—literally every bit of it. The domestic is really the engineer.

There is much satisfaction and great gain, as your husband knows, by having the engine all ready before the engineer arrives. Our phone is (insert number).

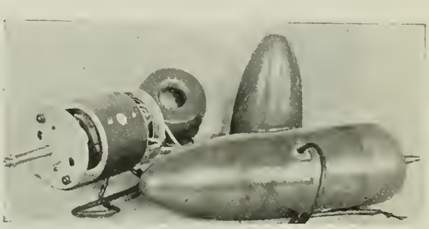
Yours truly,

Then I was careful that the man (or woman) sent out as demonstrator knew how to do a washing just like a Chinaman. An inexperienced demonstrator is worse than none for all the mistakes are blamed on the machine. Also a man or woman who thinks it is beneath his dignity to know all about the little details of washday is an n.g. salesman.

There is no reason in the wide world why washing machines cannot be placed in practically every home. Don't talk price. Don't even worry about selling the machine, but sell, rather, a washing well done, in short time, with a minimum of labor. Create the desire to own this thing which does such satisfactory work and the sales follow as a matter of course.

High Voltage Generators for Radio Communication

For use in continuous-wave radio work the Westinghouse Electric & Manufacturing Co. has manufactured a number of types of small direct-current machines, which have been used by the Signal Corps for communication in France, and by the Navy. One of these is a two-commutator generator, giving direct current at 27 volts, 2.5 amp. to light the filaments of three-element vacuum tubes, and at 280 volts, 80 milli-amp. for the output circuit of vacuum tubes used to generate continuous high-frequency oscillations. This generator is mounted on the landing-gear of an airplane, so that the back-wash of the propellor drives the generator by means of a small two-blade wooden fan. Thus the generator runs whenever the plane is in motion, and also when it is on the ground with the engine running. Constant voltage with variable speed is secured by an ingenious arrangement of differential fields controlled by a two-element vacuum tube mounted in the streamline housing at the rear of the machine. This generator furnishes power for sending and receiving radio-telephone messages between airplanes, and between airplanes and the ground.

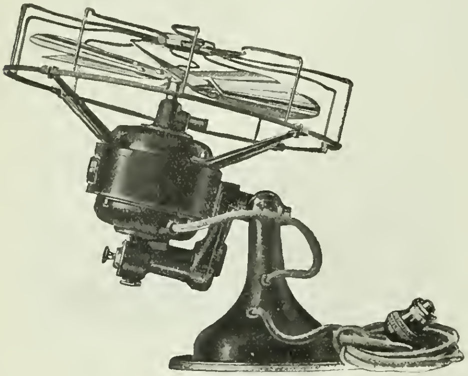

Airplane Generator

Square D Company Markets New Switch

There are some outstanding features in the new switch known as Ninety-Six Two Eleven, just put on the market by the Square D Company, Detroit, Mich. An investigation carried on by this company disclosed the fact that there is an enormous market for a switch of this type. This fact led to production of the switch in large quantities, reducing manufacturing costs and resulting in a low selling price. The new switch is shown in the accompanying illustrations. The switch is a 30 ampere, 125 volt unit, using Edison plug fuses. The current carrying parts are enclosed in a cabinet made of 16 guage steel. Switch is operated by a handle on thte outside of the box. The box is equipped with a hasp so that the cover may be locked preventing access to live parts by any except authorized persons. A lock-off device permits locking the switch in the "off" position when this becomes necessary. No. 96211 bears the combined fire and accident label of the Underwriters' Laboratories.

Notable Advance in the Design of Westinghouse Fans

Advances have been made in the design of Westinghouse single phase alternating-current induction motors for 12 and 16 inch fans. The new design gives a wider range of operating speeds than has hitherto been found possible even witth a split phase winding, which uses reactance and resistance coils to secure a modified form of three-phase current, and requires considerable energy in the resistance and reactance coils without corresponding gain in the efficiency of the motor. A current transformer is used in the base of the motor in place of a choke coil. The starting winding is energized by this transformer and is in circuit continuously, no centrifugal switch being used. The design of this transformer makes it possible to vary the speed of the motor within wide limits without sacrificing the starting voltage and therefore, the starting torque. The primary of the transformer is in series with the main winding and the secondary in series with the starting winding. With this connection the motor receives two separate currents with large displacement which gives the necessary torque for starting the motor, and little loss when running at full speed. The motor, by using a series transformer instead of a choke coil, is receiving two currents out of phase with each other, and consequently operates as a polyphase motor of a two phase type. Such a motor has a torque at any speed down to zero, consequently the fan load may be operated at any point desired.


12 in. Oscillating Fan

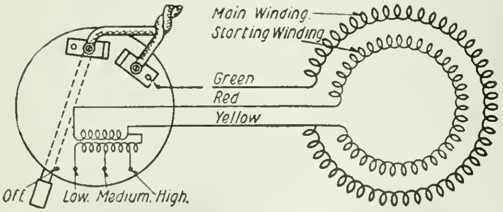


Diagram of connections

The following shows a comparison of the performance of the 12 inch fan motor with series transformer control, with one with a choke coil control:

Transformer Control

Speed	Watts	Starting Volts
High, 1,550 r. p. m.	50	66
Medium, 1,300 r. p. m.	39.5	70
Low, 1,030 r. p. m.	32	80

Speed change, 520 r. p. m.

Choke Coil Control

Speed	Watts	Starting Volts
High, 1.645 r. p. m.	45.5	56
Medium, 1,510 r. p. m.	40.0	80
Low, 1,415 r. p. m.	39	90

Speed change, 225 r. p. m.

The comparison shows a considerably greater speed change with the series transformer control and a further advantage in the starting voltage. This type of winding eliminates the use of the centrifugal switch used with the choke coil. The change renders the motor less liable to injury through lack of attention and careless handling. The power imput is slightly greater, but the efficiency is increased accordingly with the added advantage of a greater change, and the impossibility of burning out the starting winding of the motor. The choke coil, using reactance and resistance, wasted energy in the coils without a corresponding gain in efficiency.

The Imperial Trading Co.

Further evidence of deep faith in the future of Canada and Canadian commerce is furnished by another new company, recently formed, the Imperial Trading Company, with head offices in the Herald building, Montreal. This company intends to deal in iron, steel, copper, brass lead, spelter, and other metals; in rails, railway equipment; motors, generators, transformers, and machine shop tools; wool felt, cotton waste and other textile products, also pulp mill and mining machinery. The company is also negotiating for a number of sole agencies for Canada, of important products from the Orient, including China, Japan, East Indies, Malay States, India, Ceylon, Indo-China, Straits Settlements, etc. The president is Major G. A. E. Bury, son of Sir George Bury. Major Bury, before joining the overseas forces, was a prominent barrister in Winnipeg; he returned to Canada recently after over three years with the Canadian expeditionary force; he is a graduate of the University of Manitoba. The vice-president and general manager is Mr. E. C. Peterson, formerly district manager of the Northern Electric Company, Limited. Prior to that, he was in charge of the production department of the Western Electric Company, Chicago, with which he began his business career in September, 1899, immediately after graduating from the Iowa State College, in mechanical and electrical engineering, receiving the degree, B. Sc.

Personal

Mr. Ernest Oliver, Toronto, has been appointed superintendent of the Toronto, Niagara & St. Catharines electric railway by the Board of Directors of the Canadian National Railways.

Mr. Geo. J. Nelson, B.Sc., for many years chief draughtsman for Mr. R. S. Kelsch, consulting engineer, Montreal, is recovering from a severe attack of pneumonia. He will soon be able to resume his duties.

Mr. Lawford Grant, who has severed his connection with the Eugene F. Phillips Electrical Works, Ltd., was, on February 8, entertained at dinner at the Engineers' Club, Montreal, by the staff of the company, and presented with a mahogany clock.

Captain F. R. Glover, assistant general manager B.C.E.R. Company, has resumed his duties after an absence of nearly three years. Before returning to Canada last year, Captain Glover was in France with the Canadian forces, his regiment participating in the Vimy Ridge battle. For the past year he has been superintending the Dominion police activities, in connection with the Military Service Act, in British Columbia.

POWER CABLE

350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

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Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary Vancouver

Current News Notes

Hastings, Ont.

A new Hydro transmission line has been proposed from Healy's Falls, to serve the municipalities of Havelock, Belmont, Norwood, Hastings, Keene and Westwood. The line, if constructed, would also serve as an auxiliary source of power to the city of Peterboro.

Markham, Ont.

A by-law was recently passed in Markham, Ont., authorizing an expenditure of $5,000 on alterations and additions to the electric plant.

Montmagny, Que.

The town of Montmagny has been authorised by the Quebec Legislature to develop hydro-electrtic power and to sell current. A proposal to start a street railway was defeated.

Montreal, Que.

Messrs. Smart & Burnett, consulting engineers, Montreal, have been retained by the Canadian Rolling Mills Co., Ltd., Montreal, to re-organize their power distributing system.

The Montreal City Council has passed a resolution to the effect that as the cost of lighting and electric power is high in Montreal the city commissioners be requested to submit the question to the Public Utilities Commission, so as to obtain, if possible, a reduction in price of electricity in Montreal.

A privately promoted Bill having for its object the repeal of the contract between the City of Montreal and the Tramways Company received only two votes in the Private Bills Committee of the Quebec Legislative Assembly. The Bill also provided for the appointment of a commission to prepare a fresh contract between the city and the company, and further that any franchise or modification of existing franchise to a public utility company in Montreal should be granted only by the direct representatives ,of the electors. The City Council supported the main provisions of the Bill, having always opposed the action of the Quebec Government in taking the iniative in the matter of the contract now in force.

New Westminister, B. C.

The Tudhope Electric Motors Company, New Westminister, B. C., is proceeding with a plant for converting metal scraps by the use of the electric furnace.

Parry Sound, Ont.

With a view to extending local industry at Parry Sound it has been proposed to enlarge the municipal electric system so as to be able to supply light and power at cheaper rates.

Perth, Ont.

Hydro power was turned on in Perth, Ont., on February 19. Pending the completion of the High Falls plant, power is supplied from Merrickville. While only the factories are at present being served, it is intended to cover the whole town in the near future.

Quebec, Que.

For the first time, the Public Service Corporation, of Quebec, has published an annual statement. This shows gross of $242,335 and expenses and taxes $150,714, leaving net earnings of $91,621. Interest on the bonds took $25,000. The balance of $66,621 remaining as net profit, is carried forward to surplus, bringing the total surplus to $68,759. From this the directors set aside $25,000 to depreciation of plant, $20,000 to reserve account, and $4,000 to reserve for repairs, etc. After some minor deductions a balance of $18,159 was carried forward in profit and loss.

Regina, Sask.

It is estimated that about 8,000 miles of new rural telephone lines and extensions will be constructed by the Saskatchewan Government this year.

St. Catharines, Ont.

The annual report of the St. Catharines Hydro-electric System shows earnings amounting to $145,845, compared with $117,190 last year. Expenses amounted to $111,576, as compared with $84,409 last year. The net surplus is $24,031 as against $22,980 last year. Total assets amount to $370,713 and liabilities $255,689.

Three Rivers, Que.

The International Paper Company, N. Y., have completed plans for the development of the Rapides des Forges, Three Rivers, P. Q., in connection with proposed newsprint and pulp mills to be erected by the company at Three Rivers. The plan of the hydro-electric development includes seven units, each of 7,500 h.p., part of the power being available for the purposes of other manufacturers.

Vancouver, B. C.

Domestic lighting rates in the suburbs of Vancouver—Point Grey, South Vancouver and North Vancouver—have been cut approximately 1½ cent per kw.h. The rate is now about 7½ cents.

The city council of Vancouver, B. C., have resolved to cancel the agreement granting permission to the B.C.E.R. Company to collect six cent fares within the city limits. A public utilities board is being formed and under the provisions of the public utilities act the rate of fare existing would remain stationary until investigated by the new board. The city council believe this might take any length of time up to a year and so have decided that after April 8 their agreement shall be terminated and the matter of an increase left to the public utilities board.

Winnipeg, Man.

Premier Norris, of Manitoba, has announced an early installation of automatic telephones in Winnipeg as part of a million dollar extension programme proposed by the provincial government.

Shipment of the first two of the ten new cars ordered by the Winnipeg Electric Railway Company last June, has been made, and the remaining eight will follow at short intervals. These cars are being supplied by the Ottawa Car Company, Ottawa.

The annual report of the Winnipeg Electric Railway Company, for the year ending December 31, 1918, has just been published and shows gross earnings amounting to $3,588,723. Operating expenses amounted to $2,412,226. After adding miscellaneous revenue there was an amount of $1,221,428 to meet fixed and other charges which amounted to $931,644, leaving a balance of $289,784, excluding depreciation.

The eleventh report of the Manitoba Government Telephones has just been issued and shows total assets of $13,510,403. The plant is valued at $9,695,892. The total number of services at the end of the year 1918 was 51,760, a gain of 2,853. The total revenue was $2,003,307, operating expenses $1,493,899 and net surplus $18,766. The number of employees at the close of the year was 1,225. Payments for the year to employees on active service amounted to $41,012 and although operating expenses increased by $142,834 for the year, no increase in rate for service was found necessary.

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Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

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10 to 35 h.p. Give particulars and price to St. Mary's Wood Specialty Co., Ltd., St. Mary's, Ont. f

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5-6

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Put a Light on the Bed

Plenty of people who live in homes that do not have electric lights are interested in a means of quick light at night, a light that can be turned on without having to grope for a match. Many people who have electrically lighted homes will be glad to know how they can have a light within reach of the bed where they can turn it on without having to get up in the dark to reach a switch. These people will be interested by such a display as the following:

If the window is a big one, get a standard size single bed. If the window is smaller, get a crib. If the crib is too large, get a doll's bed. On the bedpost of this bed, of whatever size it may be, attach a flash-lamp by means of a suitable clamp, in such a position that it can be reached by a person in bed, and the button pressed to turn on the light.

Pushing the Vibrator

The sale of vibrators useful for massage and complexion purposes can be pushed by a window display featuring pictures of pretty girls.

Collect a lot of magazine covers and inside pages showing actresses or other pretty girls. When enough of these have been collected to cover the background of the window and make an effective showing, arrange them artistically, not merely put up in rows, but framed up with mats cut out of fancy colored papers. Then make your display of the vibrators with a card explaining their use as complexion aids, and incidentally for other purposes. Put up a big card reading, "Complexions Made Beautiful" with the sub-title, "with the help of a vibrator. Why use harmful cosmetics "

It is very likely that it will be better to emphasize here the vibrator idea and put the soft pedal on "Electricity" because some people feel a little afraid to use electricity in this form, especially if they have never had any experience of that kind. Do away with any idea of there being anything mysterious about the device in appealing to such people, as otherwise they may be afraid of it. If you are appealing to a class of trade that is familiar with all sorts of electric appliances, just the opposite may be true and you may bear hard on the idea that electricity will help the complexion through the medium of the vibrator, thus capitalizing the faith some have in the power of electricity to accomplish almost anything.—Electrical Merchandising.

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1	[illegible]	2	60	220	[illegible]	Fbks-M.
1	25	3	25	550	725	Westg.
1	25	2	60	220	945	Westg.
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2	20	3	25	550	710	Westg.
1	15	3	25	550	1500	C. G. E.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	Westg.
1	7½	3	25	550	1500	Lang-Dav
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
1	6	2	66	220	1200	T. & H.
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Returned Technical Men Being Properly Cared For

Since our issue of March 1, which announced the opening of a clearing house for returned technical men in Toronto at 287 Queen Street West, this office has been placed in charge of Major R. D. Galbraith, late of the Canadian Machine Gun Corps and Canadian Railway troops. The credit of the idea of these bureaus, we understand, belongs to the Joint Committee of Technical Organizations, who are also still acting in an advisory capacity to the Government. In Toronto the Joint Committee have undertaken to stand behind the organization and lend their assistance in bringing the returned technical men into contact with employers of technical labor and, to this end, have sent out the following letter to manufacturers, contractors, municipalities, etc. Present indications we understand, are to the effect that the bureaus will meet with a ready co-operation of employers and that the supply is not likely to greatly exceed the demand in any line of technical work. The letter is self-explanatory:

Re: Re-employment of Technical Engineers who Have Been Overseas

As you are doubtless aware, the Dominion Government has recently established a large number of labor employment offices in various Canadian centres, through which returned soldiers and employers are being brought in touch with one another.

As it appeared most desirable that returned technical men should also be assisted to get in touch with the openings, for which their training and experience specially fit them, we approached the Dominion Government, with the result that employment bureaus, known as Professional and Business Occupation Sections, are being opened in Toronto, and a number of other centres throughout Canada. These offices will be in charge of returned engineer officers, who will have the necessary data regarding the qualifications, experience, etc., of the returned technical men on file, this information being secured while the men are in transit. The men will also report to the office in their district and see that the information is supplemented where necessary.

The Toronto Office has been opened at 287 Queen Street, West, and is in charge of Major R. D. Galbraith, recently returned from overseas.

Our object in addressing this letter to you is to advise you of the facts as above, and to invite you to communicate to Major Galbraith the particulars of any vacancy or probable vacancies in your staff requiring men with technical training. We respectfully urge that this matter receive your immediate attention.

We trust that this movement to re-establish the technical returned man in the work for which he is best fitted, and where he can be of the greatest use to his country, will receive your warmest co-operation.

Yours very truly,
Wills Maclachlan,
Secretary,
J. C. T. O.

Note.—As indicating the co-operation of local business men, we are authorized to use the names of the following gentlemen, who have expressed their entire approval of this scheme and undertaken to give it their hearty support.

C. N. Candee—General Manager Gutta Percha & Rubber Co.
F. G. Clark—Chief Engineer Toronto Power Company.
E. L. Cousins—Chief Engineer and General Manager Toronto Harbor Commission.
H. H. Couzens—General Manager Toronto Hydro-electric System.
F. A. Gaby—Chief Engineer Hydro-electric Power Commission of Ontario.
R. C. Harris—Commissioner of Works, Toronto.
G. G. S. Lindsay—Barrister, Toronto.
Senator Nicholls—President and General Manager Canadian General Electric Co.
W. A. McLean—Deputy Minister of Highways, Province of Ontario.

Telephone Men and Signallers in the War

"Without the help of the telephone men and signallers at the front we could not have won the war," said Brigadier-General W. O. H. Doods, in speaking at the Montreal Electrical Luncheon on March 5. The General's talk was on "Telephones at the Front," and was a description of the telephone system in connection with artillery. He told of the absence of this equipment when the Canadians were mobilized, and to illustrate the difficulty of getting telephones in the early days of the war mentioned that it was easier to replace a disabled 18 pounder gun than it was to get telephones. In the early part of 1915 all wires were laid overland. As showing the dangerous and splendid work of the linemen, the General stated that these men won more honors than any other section of the artillery. In June, 1915, the brigades were loaned some Ericsson telephones which proved very efficient. Supplies of wire were difficult to secure, either of D1 or D3, and weekly reports had to be made of the quantities used and those on hand. In July, 1915, they obtained a wireless mast—this serving four Brigades. At the beginning of the war the signallers had little knowledge of the Morse code, relying mainly on the semaphore. Later the signallers became much more efficient in the use of the Morse code.

Originally signal communication was in the hands of the adjutant, then it was transferred to the orderly officer, and eventually was put in charge of the Canadian engineers, who laid out the system. Much improvement was also carried out in the matter of burying the wires, enabling the artillery to open fire very promptly. The switchboard equipment was made more efficient as the war progressed. The four-way switchboards were increased to eight-way boards, and by the fall of 1916 there was an issue of the regular sixteen-way French switchboard, in addition to which the eight-way boards made by the signallers were used as auxiliaries. Bell telephones were used to communicate with the Brigade headquarters, but not in the front line.

At the Somme the Canadians did splendid work in burying the wires whilst under fire. In 1917 the signalling system was improved in every way. At Vimy Ridge, in 1917, the communication was absolutely perfect, and the men were able to speak a distance of 50 miles back. The first battle of Amiens was an open fight, and here air lines, it was found, were not destroyed as quickly as the lines laid along the ground. There was no occasion to bury the lines owing to the rapidity of the fight. Lines were laid as the troops advanced to enable communication to be made with headquarters, and in this connection portable wireless outfits proved of great value.

Means were taken to prevent the enemy from picking up messages on the telephone wires, one telephone being so constructed that it was impossible for the Hun to pick up any communication with his listening apparatus. The men were told not to rely absolutely on the telephone. Experience, however, proved that they were forced to do this, and that it was the lamps and flags which fell down, and not the telephone.

Joint Committee Annual Meeting March 24

The Joint Committee of Technical Organizations will hold their annual meeting in the Physics Building Theatre of the University of Toronto on Monday, March 24, at 8 p.m. The programme will consist of President Geo. A. McCarthy's annual report, in which he will outline the activities of this organization during the past year, which, we understand, have been very extensive. This will be followed by an address by Mr. H. J. Daly, on the subject, "Industrial Economics—the Employer's Standpoint." Mr. Daly has come into particular prominence as Director of Repatriation for the Dominion Government, which office he recently resigned, and is one of the best known industrial figures in the Dominion. The labor standpoint will be presented by Mr. Tom Moore, President Trades and Labor Council of Canada, who will speak on "Industrial Efficiency—From the Labor Standpoint." Mr. Moore is known as a labor man with very broad and sound ideas, and recognized as one of the outstanding figures in the solution of the problems confronting us at the present day of bringing labor and capital into closer working relationship.

The Canadian Drill and Chuck Company, Limited, Toronto, has been taken over by Mr. H. P. Ash, late manager of the Royal Bank, Welland, Ont., and will be known as "The Canadian Drill and Electric Box Company." The business, which is located at 1402 Queen Street East, Toronto, will be under the management of Mr. Harley W. Morden, who is well known in the electric trade.

Toronto Section A.I.E.E.

Report of meeting held at the Engineers' Club on Friday, March 7, 1919.

The Chairman introduced the subject for discussion, which was "The Future Organization of Electrical Engineers in Canada." He pointed out that electrical engineers in this country were insufficiently organized, especially in matters affecting their relations with the Government. Greater activity could be expected in electrical matters if we were organized on a national basis, at the same time maintaining our connection with the A. I. E. E. The A. I. E. E. had not openly pushed the formation of branches in Canada, but this work could be undertaken on a larger scale by a proposed Canadian I. E. E. in co-operation with the American Institute.

Mr. Wills Maclachlan reported having had a talk with the A. I. E. E. authorities in New York more than two years before, when he suggested that a Canadian I. E. E. would ultimately grow out of the sections in Canada. He found that the directors of the A. I. E. E. were quite sympathetic with the idea. In February last, following a suggestion from the Toronto section, a special committee was appointed by the president of the A. I. E. E. to consider and report upon the formation of a Canadian institute as outlined above. Any technical organization should embrace the following features if it were to be an efficient body.

(a) Interchange of technical ideas.

(b) Furthering of the interests of members.

(c) Service to the community.

(d) Recognition of engineering status of members. All of these could be more perfectly obtained through a Canadian Institute of Electrical Engineers than through a branch of a U. S. organization.

Mr. H. H. Couzens raised the question whether the scope of the proposed society was to be purely technical; if so he thought this would limit its field too much. What we seemed to need was a new society to co-ordinate existing electrical societies, including the business element, and bringing them all together in matters of general and public policy, with its consequent advantages of greater publicity. He would be glad to see the manufacturer, jobber, contractor and financier of electrical interests brought under one governing electrical body which would provide a nucleus for their, at present, somewhat scattered activities. What present organization can fulfil these ends? Not the Engineering Institute of Canada, because membership is barred except to professional engineers. The Canadian Mining Institute, for example, has a better policy in permitting non-engineers to join the association if they are in any way interested in mining work. A new organization would have the valuable opportunity of doing the same thing for electrical engineers and electrical men generally.

Mr. W. Volkman showed that it was quite practical for a Canadian society to work harmoniously in affiliation with a U. S. body. The Canadian Electrical Association was started 28 years ago, and 8 years ago it affiliated with the N. E. L. A. By this means members of the C. E. A. were entitled to all the advantages of both societies and to get the benefit of the literature published and the work done in the U. S. The President of each body was a director of the other. The Canadian Electrical Association retains its status as a distinct Canadian body although for the purpose of mailing and organization it is referred to by the N. E. L. A. as a geographical section.

Mr. S. L. B. Lines, on being appealed to, stated that he believed the South African I. E. E. to be working quite satisfactorily in affiliation with the British I. E. E. He thought that the proposals for the institution of a Canadian I. E. E. did not go far enough; he would like to see it as

Canadian as possible and not too closely tied up to a foreign organization.

Mr. E. V. Pannell pointed out that it was hardly possible as a first step to sever connections with the A. I. E. E. in New York. In the first place all our members rated their advantages very highly, especially the proceedings and transactions. Furthermore, the autonomy proposed was complete enough for all practical purposes. As a matter of interest it might be mentioned that of the annual dues of about $10.00 per member, $5.00 was spent in editing and printing the proceedings, and a further $1.50 in printing the transactions. It might be thought advisable at some future time to sacrifice the latter in order that we might apply the allotment to better uses.

Mr. W. A. Bucke was quite in sympathy with the idea of a Canadian Institute as proposed; he thought that the next step further would result in an entirely Canadian engineering association which should be our ideal. It was undesirable that any change should be made in the membership dues.

Professor H. W. Price opposed the suggestion that the transactions might have to be sacrificed. He thought them of very great value.

Mr. H. U. Hart had recently attended the annual meeting of the Engineering Institute of Canada at Ottawa and had a talk with Professor Comfort A. Adams, the president of the A. I. E. E. there. He believed that the president was in sympathy with our ideas, and that the A. I. E. E. would help us to the fullest possible extent to get our own organization.

Mr. A. H. Harkness (Engineering Institute of Canada) had been asked to attend the meeting by Mr. Keith, the secretary of the E. I. C. He was glad to see the effort of the electrical engineers to have their own national body, but would call attention to the advantages of the Engineering Institute. The change in name from the Canadian Society of Civil Engineers was accompanied by a complete change of policy, by which all engineers were eligible to become members. A seperate Canadian I. E. E. would result in dividing the forces of the engineers. The E. I. C. was studying the matter of taking legislative action to protect the position of the engineer and this was needed just as much by electrical men as by professional men of other branches of engineering. He acknowledged the value of the technical advantages derived from the A. I. E. E. which would be continued by the proposed Canadian I. E. E., but believed that the social and political value of the E. I. C. was even greater. The present practice of the E. I. C. was to have electrical, mechanical and other sections at their various branches. These sections should, of course, be general throughout the whole institute and not confined to the branches.

Mr. Wills Maclachlan said that this scheme of sectionalizing the Engineering Institute of Canada so that electrical and other non-civil engineers would be on an equal plane was approaching the ideal, but that it did not exist and the E. I. C. constitution did not permit of it. It was far better for the formation of the Canadian I. E. E. to go ahead and await any change in the constitution of the Engineering Institute of Canada, which would make it more attractive for electrical engineers than it was at present.

Professor Gillespie (Engineering Institute of Canada) believed that the Engineering Institute provided the natural society for all kinds of engineers ,and that although it manifestly did not offer the technical advantages received at present from the A. I. E. E. the Canadian members ought to support it. Quite recently the E. I. C. had to memorialize the Ontario Parliament on a matter of legislation affecting all engineers. He did not think that more than one engineering society in Canada could be supported. The nationalization of railways and other extensive engineering works would mean that increasing numbers of engineers were coming under Government employ, and this would be a factor in favor of the Engineering Institute.

Mr. A. E. Davison thought that the men best qualified to give an opinion on this subject were the consulting engineers. He felt that the formation of the Canadian I. E. E. was a step in the right direction, and thought that the matter of federation with other engineering societies might follow at a later stage.

Mr. E. B. Merrill had long felt the anomalous position of being in the purely local section of a United States society. He believed the proposed change to be advantageous.

Mr. John Murphy claimed responsibility for the original suggestion to change the name of the Canadian Society of Civil Engineers. He had primarily joined this society to keep out of jail, because he found it was impossible to practice as an engineer in Quebec except by being a member of the society. As the Engineering Institute of Canada it had changed its constitution very thoroughly and he thought time was opportune for a further change which might appeal to the electrical engineers of Canada.

Mr. W. P. Dobson repeated that the technical advantages of the A. I. E. E. were far beyond those of the E. I. C. as far as electrical engineers were concerned, and he would never think of dropping membership in the former in favor of the latter.

Mr. P. A. Borden endorsed this view. He was also opposed to the formation of a small society which would be entirely dissociated from others.

Mr. A. H. Winter Joyner thought that the British I. E. E. should not be neglected when affiliation was being considered. He believed that their proceedings were very valuable and that when affiliations of the proposed Canadian I. E. E. were being thought of attention should not be concentrated upon any one society to the exclusion of other societies.

Mr. S. L. B. Lines, in answer to a question by the chairman, stated that an attempt had been made some years ago to found a branch of the I. E. E. in Canada, but it had to be abandoned partly owing to the small number of members in the country and partly owing to the war.

Mr. Wills Maclachlan then moved the following resolution:—

"That this meeting is in favor of a committee being formed to consider and report upon the forming of a Canadian Institute of Electrical Engineers which shall be in affiliation with the American Institute of Electrical Engineers and possible affiliation with other engineering bodies."

Mr. Dobson seconded the motion.

Mr. W. A. Bucke moved an amendment adding the words "And that due consideration be given to the strong adivisability of affiliation with the Engineering Institute of Canada."

Professor H. W. Price seconded.

Mr. H. C. Don Carlos strongly criticized the amendment. He was confident that the Engineering Institute had not made out a case, showing how such an affiliation would be of any advantage to the electrical engineers.

Mr. S. L. B. Lines asked what was understood by the United Engineering Society in the States. Was this an association open to all engineers, like the Engineering Institute of Canada? If so it would seem that we ought to follow their lead and join or affiliate with the E. I. C.

Mr. Willis Maclachlan pointed out that the United Engineering Society was nothing of this kind. It was a committee on which sat representatives from the four main engineering societies: Electrical, Mining, Mechanical and, latterly, Civil.

On being put to the meeting the amendment was lost, as follows: For, 4; Against, 35. The voting on the motion was: For, 39; Against, 0.

Mr. A. E. Davison was in favor of getting the opinion of the meeting as to whether it might be advisable for the proposed Canadian I. E. E. to federate with other national bodies on an equal basis.

Mr. H. C. Don Carlos moved that it is the opinion of this meeting that there should be a national organization of engineering societies in Canada.

Mr. A. E. Davison seconded and the suggestion carried unanimously.

The meeting adjourned with a vote of thanks to the members of the E. I. C., who had taken the trouble to be present and join in the discussion.

Public Utility Accidents

The more we study the cause of accidents, the more evident it becomes that most accidents are preventable. Hence the paramount importance of such propaganda as that being carried on by the Ontario Safety League and the Accident Prevention Departments of the Electrical Employers' Association and the Ontario Hydro Electric System. Further valuable records are now to hand in a recent paper by Mr. E. M. Davis, Statistician, Utilities Mutual Insurance Co., in a recent issue of the Electrical World. Mr. Davis' company has confined itself exclusively to public utility business and gives the statistics regarding the analysis of some 1,170 cases over a two-year period.

Delay Necessary in Arriving at Cost of Accidents

It is a peculiarity of the compensation business that the exact cost of an accident cannot be immediately known, as in the case of a fire loss, since the injured employee must receive compensation until he is able to return to work, and this is always an indefinite period, because no one is in a position to know just when the return to work will occur. As a consequence, it necessitates the study of the accidents that have occurred in a more or less remote period, and the Utilities Mutual Insurance Company has therefore only recently made this study of its first two years' experience

This survey involved 1,172 accidents occurring between June 30, 1914, and June 30, 1916, and is a complete record of the accidents incurred by those public utility companies insuring with the Utilities Mutual. Most of these companies were electric companies, although there were numerous gas companies and a few street railways. Of these 1,172 cases, full payment had been made on all but ten and the cases had been closed, but these ten involve continuing disability or continuing dependency, so that their actual and final cost could not be absolutely determined, although estimates could be made which would very closely approximate the actual cost.

The total number of days lost per accident is certainly a very fair indicator of the seriousness of the accident; but from a purely business basis the more satisfactory figure, and the one harder to obtain, is the cost of each accident.

The percentage of total days lost chargeable to each accident according to occupation shows that over 94 per cent of the lost time among public utilities is assignable to seven different occupations—linemen, laborers, firemen, switchboard operators, groundmen, carpenters, painters and masons (these three being grouped together) and locomotive engineers—and it is noticeable in this regard that these seven classifications each include one or more fatalities. It may, therefore, be quite positively stated that in public utility operations fatalities are the ones to guard against, partcularly when the last three classifications—linemen, laborers and firemen—where a total of twelve deaths is recorded out of sixteen and where the total days lost amounted to 72.8 per cent of the entire lost time, are considered.

It may be finally boiled down to a bare statement that in public utilities laborers and linemen account for 58.62 per cent of the total time lost due to accidents, while they account for 49.05 per cent in respect to the cost.

Five Classifications Cover Causes

The analysis of these 1,172 accidents as to cause shows that explosives, electricity, fires and hot and corrosive substances; falls of persons; boilers and steam-pressure apparatus, machinery and handling objects account for more than 95.85 per cent of the total time lost, and it is found that these five classifications contain all of the fatalities reported in the two-year period.

In respect to the total cost, there is a slight rearrangement of the classifications again, as shown by the following: Days lost—explosive, electricity, etc., falls of persons, boilers and steam apparatus, machinery, handling objects; cost—falls of persons, explosives, electricity, etc., boilers, and steam-pressure apparatus, handling objects, machinery.

These five classifications account for 82.80 per cent of the cost of accidents, and aside perhaps from the classification "falling objects," which contributed 5.41 per cent of the cost, it may be said that these five classifications are the ones that should receive the greatest attention.

Summarizing, therefore, it may be definitely stated that the public utilities should exercise their greatest care for the protection of their employees, first, where linemen are concerned; second, among laborers; third, firemen; fourth, switchboard operators; fifth, groundmen; sixth, carpenters, painters and masons; seventh, locomotive engineers; They should particularly guard against accidents arising from the operation of, first, falls of persons; second, explosions, electricity, etc.; third, operation of boilers, steam, etc.; fourth, handling of objects; fifth, machinery. If conditions are still further analyzed, it may be positively stated that electric current and the boiler room are two of the three principal contributors to accidents among public utilities.

Such an analysis as the above should be the first study in accident prevention, and the second should be to provide the guards, the inspection service and the education to the employees to prevent these accidents. It is unquestionably true that the education is the very much more difficult portion of the work, but it cannot be intelligently undertaken unless such statistics as presented above have been accumulated.

As an indication of what the above facts mean, falls account for 13 per cent of the 1,172 accidents, or an actual number of 148; 24 per cent of the total lost time, or 33,000 working days, is assignable to this one cause, while 31 per cent of the total cost, or $23,800, is contributed by falls alone. Again, linemen alone fell often enough to absorb 73 per cent of these 33,000 lost working days and 53 per cent of the cost, $23,800. The moral of this is "Watch your step."

On the other hand, electricity contributed 11 per cent of the total number of cases, or 119 accidents: 40 per cent of the lost time, or 55,300 working days, and 24 per cent of the total cost, or $18,400. Under the heading "electricity" linemen absorbed 23,000 days lost, at a cost of $4,497; laborers in the plant 15,000 days lost, at a cost of $5,200; switchboard operators, 7,900 days lost, at a cost of $4,017, and wiremen 1,735 days lost at a cost of $2,722. If, therefore, accidents to these four classes of workmen about public utility plants are eliminated, 85 per cent of these lost working days and 87 per cent of this accident cost will be saved.

The Characteristics of a House-Heating Power Load

By Mr. H. B. Dwight

The article on "Heating Our Homes with Electricity" in the Electrical News of February 1st, contains very valuable new data on this subject. Now that the coal shortage and the power shortage are practically over, the question which is of interest at present is not whether an entire city can be heated by electric energy, but whether residence heating is profitable at present rates for power, to both the householder and the power company.

Whether the automatic regulation of temperature, probably for each room separately, the absence of dust and the saving of cost of furnace attendance will be worth the extra cost of electric heating to a well-to-do householder, is a question that will be gradually settled.

The total cost of the energy for the installation described, for the season, at motor rates in Toronto, was $260 or 0.50 cents per kw.-hr. The cost of doing the same heating by coal, including $5.00 a month for the furnace man, is estimated in the article at $179, which would be equivalent to 52,700 kw.-hrs. at 0.34 cents per kw.-hour. Now power has been sold in favorable localities at a rate nearly as low as this when it was sold in bulk, and with the voltages more or less unregulated. It, therefore, appears that in certain districts surrounding water power plants, electric power can at the present time, possibly, compete on a direct cost basis with anthracite coal and a furnace man.

There seems to be enough information already available to indicate that a residence heating load is at least as attractive to a power company as any ordinary motor load, and should command as low a rate. The total energy required to heat the residence described in the article of February 1st was 52,700 kw.-hours. The maximum rate was 26 h.p., or 19.4 kw., which, if used 24 hours a day and 365 days a year, would amount to 170,000 kw.-hours. Therefore, the yearly load-factor is $52{,}700/170{,}000 \times 100 = 31$ per cent. This is as good a yearly load-factor as that of any usual motor load, on which power rates are based. For instance, a motor running at full load for 9 hours a day and 5½ days a week has a yearly load-factor of only 30 per cent. It is therefore not fair to state that a residence heating load is a seasonal load and so cannot be given as low a rate as a motor load. It has so much better monthly load-factor during the winter, lasting as it does 24 hours a day and 7 days a week, that it can be idle all summer and still have a better yearly load-factor than an ordinary motor.

There are other advantages of a residence heating load, from the power company's point of view, than its good yearly load-factor shown by the Toronto experimental installation. First, it has 100 per cent. power-factor, while a motor load has usually from 85 to 90 per cent. power-factor. Second, where it is controlled by thermostats, the load is probably somewhat heavier at night than in the daytime, since the outdoor air temperature is then about 10 degrees lower, and the house is also not receiving energy by radiation from the sun. Third, a large voltage variation can be allowed without inconvenience with a heating load controlled by thermostats. The variation can be probably twice as great as can be allowed with motors, and several times as great as can be allowed with lighting. This would enable the distribution lines to be designed very economically, and would tend to counterbalance the fact that the load would be somewhat scattered in approximately 25 h.p. units. Fourth, a valley in the load curve lasting for several months is better for the supply company than equivalent valleys of short duration occurring only at night.

It should be remarked that the data given by the Toronto installation confirm those given by E. R. Shirley in the Electrical News of May 15, 1918.

It would appear that the question of building up a residence heating load is worth investigating by power companies. Probably no better method of investigation can be used than that described in the Electrical News of February 1st, of making practical installations and keeping thorough records.

Bell Telephone and Increased Rates

The claims of the Bell Telephone Company of increased operating costs are borne out by the report for the year to December 31st last. While the revenue was $1,048,383 better, operating expenses increased $918,490, maintenance $308,259, depreciation $178,760, and taxes $111,829, o total of $1,517,338. Taking into account sundry earnings, the total net earnings decreased $429,383. Mr. L. B. McFarlane, the president, points out that "the financial condition of the company made it desirable to restrict expansion within the limits of absolute necessity, and to continue the policy of development pertaining to war or war industries. Nevertheless, we show an increase of 18,944 stations during the year, and have met all such demands and other demands in the public interest. As showing the difficulty of procuring apparatus, it may be mentioned that it is necessary to order switchboards two years in advance to secure delivery. In 1918, 2,888 miles of wire were added to the long distance system. The long distance lines now owned and operated by the company comprise 85,303 miles of wire on 9,441 miles of poles, and 6,615 miles of wire in underground and submarine cables."

At the annual meeting the president alluded to the application for increased rates. He hinted that it might be found necessary to make an extensive inventory of the company's plant and equipment. This would take some two years to complete, but he hoped that the Railway Board will grant the company some temporary relief in the adoption of the new schedule formulated in the meantime. Mr. McFarlane pointed out that if this relief is forthcoming, the company's new budget, already drawn up, would be brought into force, and would result in a great deal of work throughout the company's plants and territory, this applying more particularly to new construction, telephone systems, and delayed maintenance. During the past four years, a great deal of work has, of necessity, been foregone, owing to the scarcity of labor, and the higher costs of all materials, including copper.

Impudence

The Niagara Falls "Review" very naively remarks: "There may be some truth in the statement that our local street railway line is not a money maker, but when taken over by the city the rate can be increased if necessary." And yet if the private owners asked for an increase in order to improve the service it would doubtless be called "impudence," following the precedent established by the mayor of Toronto.

The Saguenay Power Company, Chicoutimi, P.Q., has been incorporated with a capital of three million dollars, to construct and operate hydraulic, gas and electric plants, and to sell and transmit the power in the districts of Quebec, Chicoutimi, Roberval and Saguenay. Authority is also taken to carry on the business of a telegraph company.

The United States government has proposed a taxation on all United States capital invested in Canadian enterprises

Electric Welding—Methods and Results

By F. Keith D'Alton, B.A.Sc.

Welding processes may be defined as the application of intense heat to effect the fusion of metals without causing any change in the chemical composition of the material. Concentration of the heat developed, with the consequent high temperance at the point of application is the most essential feature in the different processess.

At the present day various methods are used to produce this high temperature, but these may be divided into distinct classes depending on the manner in which the heat is produced—(a) by chemical action (b) by passing an electric current through resistance. The methods of welding by means of an electric current may in turn be sub-divided into two parts, which, although similar in theory, are vastly different in practice, namely, the resistance method and the electric arc process.

(a) By Chemical Action

Where chemical action is used to produce heat, the processes depend upon the combustion together of two gases under the most favorable condititons. The products of combustion must be gaseous and of such nature that they will not combine with, or otherwise affect the metals being welded or cut. The processes under this heading which are most commonly used employ the "Oxy-Hydrogen" or the "Oxy-Acetylene" flame.

The Oxy-Hydrogen Process

Hyrdogen will combine chemically with oxygen to produce steam. To obtain complete combustion and the resultant highest possible temperature, the hydrogen gas must be mixed with oxygen in the proportion of two volumes of the former to one volume of the latter. Pure oxygen and pure hydrogen are manufactured and sold in separate tanks in which they are retained until used.

In the operation of this process the gases are led in separate tubes to a nozzle where they are mixed and ignited producing a flame at a temperature of approximately 3,500 degress F.

As the gases are held under considerable pressure they emerge from the nozzle at a fairly high speed producing a long, narrow and very hot flame.

The Oxy-Acetylene Process

Acetylene, being a compound of carbon and hydrogen will disintegrate when affected by heat, and the elements forming it will each combine with oxygen producing respectively carbon dioxide and steam. To obtain complete combustion in this case, two parts of acetylene by volume are mixed with five parts of oxygen, and these combine, producing a flame with a temperature in the neighborhood of 6,300 degrees F.

In this process the gases are handled in much the same manner as in the oxy-hydrogen process; the main difference being that the acetylene gas is dissolved in acetone under pressure and as a result much more acetylene may be stored at a given pressure in a tank of a given size. Here, too, the gases emerge from the double nozzle with considerable velocity producing a long narrow and exceptionally hot flame.

As both these "chemical" processes produce a narrow flame, they may be very successfully used for the cutting of sheet metal, making, as they do, a clean narrow cut throughout the entire thickness of the metal.

It will be noted that the oxy-acetylene flame is hotter than the oxy-hydrogen flame; the reason for this being that acetylene gas is an endothermic compound, the dissociation of the elements liberating considerable energy which also appears as heat and increases the temperature of the flame.

Acetylene can be manufactured much more cheaply than hydrogen; the fact that a good solvent for it is known and cheaply produced makes it much easier to handle; the flame resulting from the combustion of this gas with oxygen is much hotter than the oxy-hydrogen flame, and in consequence the oxy-acetylene process is replacing almost entirely the oxy-hydrogen processes in the practical application of welding and cutting in the various industries.

It must be noted here, however, that when welding or filling by either of the afore-described processes, it is necessary to feed in the metal required to do the filling. The fact that the gases come out of the nozzle under considerable pressure is somewhat of a disadvantage in welding, as it tends to spread the metal in the part being welded; but in cutting it is a decided advantage, as it helps to keep the cut clear by blowing the metal away as fast as it is melted.

Electrical Processes—The Resistance Method

In a process under this heading, the development of heat is obtained by the passage of an electric current through the parts to be welded or electrodes in contact with those parts. This process cannot be used for cutting.

The temperature can be controlled fairly easily since the heat is developed in the material and is proportional to the square of the current.

Welding, by this method, may be divided under three sub-headings, namely, butt-welding, spot welding and line welding. Butt-welding covers a class of work of the same nature as welding together the ends of bars or rods where the current passes through the bar longitudinally and through the contact between the bars. Contact resistance will undoubtedly cause a concentration of heat at the point of contact which, as it happens, is the place where most heat is required. The clamps used to connect the metal bars and the supply wires are usually of some metal having a good conductivity. Spot welding covers a very useful process used in welding together metal sheets where a continuous weld is not required. In this process the current is passed transversely through the sheets which are held tightly between carbon contacts. The heat is developed by the current passing through the resistance of the carbon blocks and no dependence is placed on the resistance of the metal sheets to develop any further heat.

This method is used only to hold the sheets together being in effect the equivalent of flush rivetting but it is a much simpler and cheaper process, as no laying out or drilling is required, but considerable difficulty is experienced in obtaining adhesion of plates due to the oxidation which occurs between them. This trouble does not occur with thick material, and may be prevented almost entirely in thin plates by ensuring contact under considerable pressure.

Only alternating current is used for this work, probably due to the flexibility of adjustment of such a source by means of transformers.

Line welding, being similar in process to spot welding, is equivalent to a series of spot welds or a line of rivets for strength, but possesses one great advantage over rivetting in ship construction in that the joint is absolutely watertight.

Electrical Processes—The Electric Arc Process

The electric arc welding and cutting processes depend for their attainment of high temperature on the arc which is formed when a current passes through air or a region of metal vapors. Direct current is used most frequently, but alternating current has been used with more or less success. The method of operation of equipment as well as the results attained thereby, are so different from the corresponding characteristics of the d. c. equipment that it seems advisable to discuss each separately.

Direct current welding—The equipment required for direct current welding may be described under three headings, namely, the generator, the control equipment and the accessories. The generator is a special machine designed to deliver direct current at 60-75 volts, according to the current capacity which will be between 200 and 1,600 amperes. All generators used for this purpose are compound wound and may be part of a motor generator set or be belt driven from any capable source running at a constant speed. The amount of current delivered to the arc is regulated by resistances on the panel, there being also an automatic protective device, preventing overload on the generator.

The main switchboard is usually of slate and contains the generator control and the welding circuit equipment for one operator only.

One main board contains: 1 2-pole circuit breaker, 1 ammeter, 1 voltmeter, 1 field rheostat, 1 dial switch, 1 field switch, 1 protective relay, 1 contactor, 1 series rheostat (mounted separately).

Auxiliary panels are used in cases where extra welding circuits are required; these contain only the equipment necessary for one welding circuit namely:—1 double pole line switch, 1 ammeter, 1 protective relay, 1 dial switch, 1 series rheostat (mounted separately).

Protection of Eyes

Each outfit requires a number of accessories, some of which are necessary, chiefly on account of the injurious effect on the operator of the ultra violet rays produced by an arc between carbon and iron, or iron and iron. Continued exposure of the eyes to ultra violet light will result in total blindness. For the protection of the body clothing is sufficient.

In order that the eyes may not be injured, a mask is used. This consists of a fibre tube which will slip over the head, and in which is a glass window, whereby the operator may observe the work, but which will not transmit the ultra violet light. In some cases this mask is supplanted by a hand shield, which is often found to be more convenient, as it can be held in one hand and removed from in front of the face when the arc is stopped. It requires only one hand to operate the electrode.

Electrode holders of two types are used. These are much the same in pattern and purpose, but one type is for carbon electrodes and the other for the thin wire metallic electrode used in welding only. Either type is light in weight and easily handled, and consists of an insulated handle with hand shield and a clamp for holding the electrode.

As we have already stated two kinds of electrodes are used, i.e., carbon and metallic, the former being solid carbon or rather graphite, the latter being iron, copper or brass, according to the nature of the metal being welded.

Carbon electrodes are used mainly for cutting, since no filler is required in this process and the arc is more stable than with the metallic electrode. These carbons are manufactured in several sizes and are chosen according to the current which is to be used in the cutting process:

Current Used	Diameter of Electrode
100 amp.	¼″
300 amp.	½″
500 amp.	¾″
1000 amp.	1″

Satisfactory cutting requires a current in excess of 200 amperes, a lower current being insufficient, but the 300 ampere outfit will do as good work as any higher capacity.

A low current density in the carbon will not heat up the electrode and the arc will have a tendency to travel around, whereas a high current density will overheat the carbon, causing it to burn away at an excessive rate.

The following table gives the sizes in which carbon electrodes are placed on the market by manufacturers:

Diameter—Length	Weight per 100 in lbs.
1/4 x 12	35
3/8 x 12	90
1/2 x 12	145
5/8 x 12	220
3/4 x 12	300
3/4 x 10	275
7/8 x 12	450
7/8 x 10	375
1 x 24	1200
1 x 16	800
1 x 12	600
1 x 10	490
1 x 9	440
1 x 8	390
1 x 6	295

Wasting of Carbons

If the electrode holder grips the carbon electrode at such a point that there is a long carbon between the handle and work, a strange action takes place. The carbon wastes uniformly throughout its length in such a manner that after a half hour's run it has assumed a new shape, being of its original length, but only about one-quarter of its original diameter. By readjustment of the holder, this trouble may be remedied.

The amount of carbon electrode used for cutting is quite variable, depending upon the current strength, method of clamping on the electrode, length of arc held, skill of the operator, etc.

Metallic electrodes are used for welding and filling only, for the melting electrode then assists in the operation.

For welding iron, the electrode is made of the purest iron that it is possible to obtain. It is in the form of round wire, of a diameter depending upon the thickness of metal being welded, which also determines the value of current to be used.

The following table covers "butt" welds in wrought iron and is copied from the G. E. Review, June 1917:—

Thickness of of Metal	Diam. of Electrode	Speed Ft. per hour	Amperes	Mean k.w. at 60 v.
1/16	1/16	20	25-40	1.8
1/8	1/8	16	30-75	3.0
1/4	1/8 –3/16	10	70-125	6.0
3/8	3/16–1/4	6.5	100-150	7.5
1/2	1/4	4.3	120-175	8.4
5/8	1/4	2.8	125-195	9.3
3/4	1/4	2.0	125-200	9.6
1″	1/4	1.4	125-200	9.6

Metallic electrodes are furnished either bare or flux-covered, as desired, but it is a question whether the flux covering is of any actual advantage.

Flux Covered Electrodes

The heat produces a small pool of molten metal on the parts to be welded, then additional metal is deposited in the molten state from the electrode. With the flux covered electrode, the flux melts with the arc and keeps the molten metal covered with a silicate slag which floats on the surface of the metal. It also surrounds the heated area with an inert gas, thus preventing possible oxidation. When cold, the solidified slag may easily be removed by a wire brush. The flux covered electrode does not demand as good regulation of the current as does the bare metallic electrode.

In describing in general the process of electric arc welding by means of a direct current outfit, it should first be noted that the material being welded forms the positive electrode, properly called the anode. The reason for this is that considerably more heat is developed at the positive than at the negative electrode.

Slow action in welding may be due to reversed connections or to poor contact between the positive lead and the work

The operator, having his machine running, adjusted to give normal voltage, with all cirucits completed, has the electrode holder in one hand, while the other hand holds a face shield, or is free. In the electrode holder he places either a carbon or metallic electrode, depending on the class of work he is going to do. He touches the electrode to the "job" at the point where he wishes to weld or cut, and then draws back slightly, thus striking an arc.

In cutting, with carbon electrodes, the arc is usually drawn out to about 1 inch in length. No great skill is required in maintaining it as it is most stable.

Rate of Cutting

A 300 ampere outfit will cut steel at the rate of approximately 1½ square inches of section per minute, i. e. ½ inch plates can be cut at the rate of 3 inches per minute, 1 inch plates at 1½ inches per minute, etc. This, however, varies slightly with the size of the section and the ease with which the molten metal can get out of the cut.

Equipments of other capacities will cut at a rate proportional to their capacity.

In welding, with metallic electrodes, a shorter arc is used and the current is adjusted to some suitable value, as shown in the last table given. During the welding action, the melting electrode is used as a filler in this way, making it possible to build up parts which have been broken or worn until the piece of work is of such size or shape that it may be machined to the desired design.

Especially useful is this process in railway, ship or gear manufacturing as it enables the repairing of old parts which would otherwise be thrown on the scrap heap, due to the fact that they required an addition of metal for their repair.

The ability of an arc welding outfit to successfully weld cast iron is frequently questioned. It is claimed that the efficiency in strength of the best possible cast iron weld is only 75 per cent. The result is usually a very hard central part, but a very brittle region between it and the surrounding unaffected metal. The change of physical state from cast iron to molten iron is much the same as that of ice changing to water, i.e., there is a fixed temperature of fusion, and the iron does not pass through stages of gradually increasing plasticity, but changes completely. It will be realized then that it would be difficult to control the molten metal, and the brittle result obtained when welding is attempted is no doubt due to molten iron solidfying without sufficiently adhering to the original casting.

Excess current produces porous welds, but if the flux-coated electrodes be used, the flux will have a tendency to reduce this effect, as well as giving desirable characteristics to the metal.

Alternating Current Welding

Of recent years, much has been heard of various attempts to apply alternating currents to the process of arc welding and cutting, but the results have not been very satisfactory, the chief reason being the instability of the alternating current arc which at best is limited in length to three sixteenths of an inch.

There are but two points in which the a.c. arc welding equipment can claim to be of any advantage over the d.c. outfit, namely, overall efficiency and lightness of weight in the apparatus. These are more than fully offset by the many disadvantages which the a.c. process possesses. As before mentioned, the arc is very unstable and it therefore is necessary that a highly skilled operator be employed. Furthermore, an interrupted arc produces a weld which is not homogeneous. Although some work has been done by this process which is comparable with that produced by direct current, yet the work is by no means excellent.

In a previous paragraph, stress was laid upon the fact that the electrode must be of negative polarity in order to obtain the best concentration of the heat. With an alternating current this is impossible and, as a result, the a. c. arc with a given current, will not be as hot or effective as the d. c. arc. This, no doubt, will reduce the margin of efficiency of the a. c. outfit over the d. c. equipment.

The a. c. arc welding equipment simply consists of a small transformer having a large leakage reactance and designed to reduce the voltage to the desired amount. Its effect on the electrical supply system is generally bad. Under load the primary power factor is very low, about 35 per cent., and the frequent interruption of the arc causes an objectionable winking of all lights on the circuit.

The method of operation is very much the same as with the direct current equipment and an outfit of this sort may be found an advantage where the matter of delivery in purchasing or portability in operating will counter-balance the various disadvantages.

Comparisons of Processes

In comparing the processes described as to their commercial desirable and undesirable features, we see that the gas process is preferably for cutting, that the electric resistance process is solely of use for welding and that the electric arc process is very convenient for cutting, but has its chief use in welding on work requiring filling or a higher temperature than we obtain by the electrical resistance method.

With the gas process, the gas tanks must be transported frequently to and from the gas manufacturer, but the flame makes a clean narrow cut unattainable by the electric arc. It does not deposit carbon in the weld, but always necessitates the introduction of a "filler" when welding.

The electric resistance process can be used for thin sheets only, but the equipment is not large and may be conveniently transported.

The electric arc process has many parts to get out of order and requires more skill to operate than the other systems Initial cost of equipment is high, but the only subsequent costs are for electrodes and for power, and these are comparatively small items. Its main advantageous features are the certainty of good work when carefully handled, and speed and convenience in operation.

Cost

Setting aside the electric resistance and a. c. arc processes, it may be of interest to draw a comparison between the costs of operating oxy-acetylene and direct current electric arc methods.

For thin material, the cost of the processes are approximately equal. As the thickness of the metal increases, there is an increasing margin in the cost in favor of the arc process. The same cost applies to cutting by both processes up to about 1½ in. material. Gradually the cost of gas cutting becomes greater than the arc process until for about 6 in. material, the cost is about 60 per cent. greater than the above This relation, of course, will vary with the type of work, and also with the skill of the operator, but for approximation the above will suffice.

In welding it is found that at about 1/8 in. thickness the gas process cost is equal to the cost when the arc process is used. As the thickness of the metal increases the gas process suffers by comparison and from ¼ to ½ in. the costs by gas are approximately double than when the arc is used.

Electric Railways

Winnipeg Electric Railway Company Buying New Rolling Stock from Ottawa Car Co.

The Ottawa Car Manufacturing Company Limited have already delivered six car bodies of an order of ten to the Winnipeg Electric Railway Co. The description ot these cars is as follows:

Type of Car—Double truck, single end, semi-steel motor car with arch roof.

Seating capacity	46 persons
Weight of car body	19,000 lbs.
Length of car body	33′ 3″
Length of front vestibule	5′ 0″
Length of rear vestibule	7′ 6″
Length over bumpers	45′ 8″
Distance between bolsters	21′ 6″
Width over all	8′ 6″

The bottom frame and sides are of steel with side sill made up of 5-inch x 3-inch x ½-inch angle, rivetted to side plate 18-inch x 5-16-inch; cross members are of 4-inch x 5-16-inch plate, also 4-inch channel at 7.25 lbs., reinforced with oak cross sill; headstock made up of 10-inch x ½-inch steel plate with two 4-inch x 3-inch x ½-inch angles rivetted together.

Bolsters are made up of channels—top 12-inch at 25 lbs., bottom, 10 in. at 20 lbs., with cross channel at centre. Front vestibules, centre and side knees are of 6-inch channels, at 8 lbs. running through to bolster, bumpers 6-inch channel at 13 lbs. with 3-16-inch cover plate for toe board. Rear vestibule centre knees are 6-inch channel, running through to bolster; side knees are of 4-inch channel made up in cantilever style; toe board also of 3-16 inch plate.

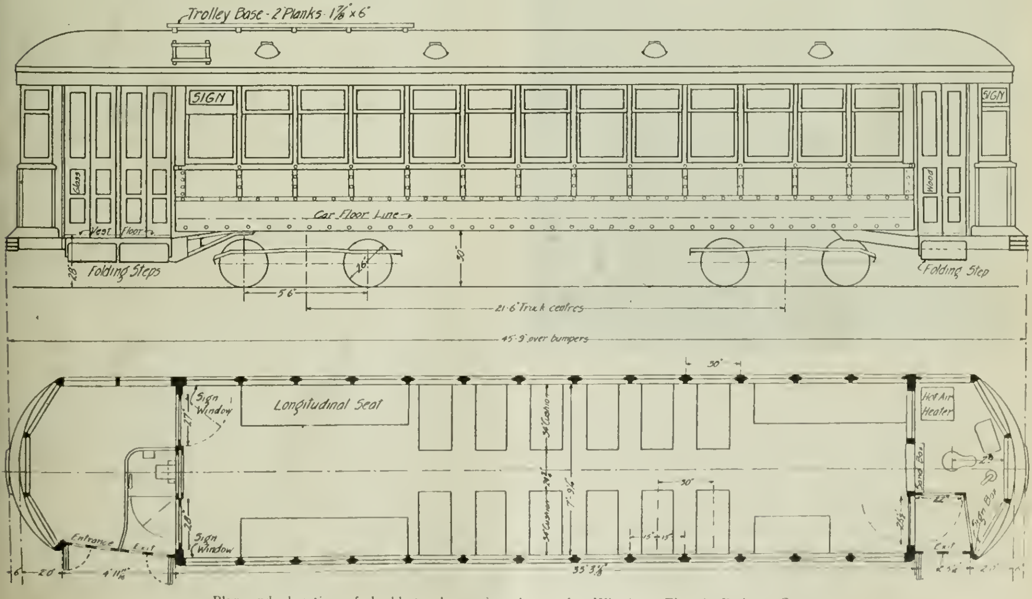
Above side plate and below belt rail 16 gauge panels are used between side posts with 1-8-inch strap covering joint. This arrangement facilitates repairs. Belt rail is 2-inch x ½-inch steel strap bolted to post, with beaded bar rivetted to top of side plate with 4-inch x ½-inch reinforcing plate inside.

Body posts are of white ash, straight and grooved for sash. Wood belt rail covered with No. 16 gauge steel.

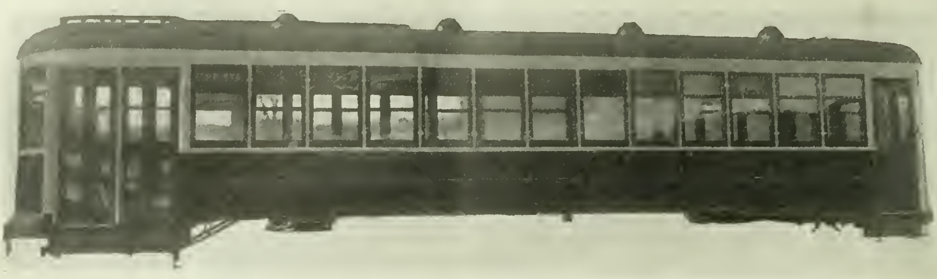
Front and rear vestibule doors are two leaf folding out and back, controlled by motorman and conductor, with which are operated a folding step, provided with Ottawa Car Mfg. Co. anti-slip tread.

Keystone illuminated sign box is placed in the front vestibule right hand window, also Keystone side window signs are being installed on each rear window. The interior lighting arrangements include five shaded lights in the centre of arch roof, through selector switch on rear platform over conductor's position.

Seats are Hale & Kilburn light weight pressed steel fittings, with Ottawa Car Mfg. Co. spring upholstered cushion



Plan and elevation of double-truck, semi-steel cars for Winnipeg Electric Railway Company.



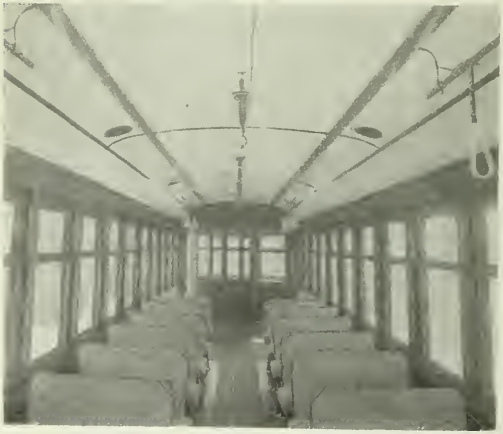
An unmounted body of one of the new cars built for Winnipeg street-car service

and back, covered with rattan. Motorman's seat is the Electrical Service Supply Co.'s and conductor's seat the Ottawa Car Mfg. Co. standard drop seat.

Heating arrangements are Peter Smith Hot Air Heater No. 2-P. O.

The rear bulkhead has swinging door with door-check arranged to swing in for entrance side, full panelling and sash at centre, sliding door for exit. Front bulkhead has door mounted on double acting spring hinges on right hand side of exit, panelling and two sash with louver in upper half of left hand sash. A protective compartment is installed in rear vestibule for conductor and provided with raised floor about 4-inches high also heater and seat. A winter partition is also arranged for motorman in front vestibule.

Sand box installed in front bulkhead with O. B. sander valve, arranged to sand both rails. Front vestibule windows have double glass with extra storm sash fastened from inside to protect the motorman from frosted windows.



Interior view of one of Winnipeg's new cars

Rear vestibule doors are fitted with electric signal and arranged with switch on door frames, with electric light in front of motorman. The Faraday signal bell system is installed, which provides a dependable and economical means of operating car push buttons, direct from trolley circuit of 500 volts.

Draw bars are provided at each end with Winnipeg Electric Ry. standard draw head with Ottawa Car Mfg. Co. improved spring case. Side sash are arranged to lift up with an automatic cam lock. The advantage obtained by the use of lift-up sash is that the absence of lower pockets makes the car more sanitary, because the chance for careless patrons to use the pockets as a place into which to throw or drop rubbish is done away with.

The interiors are finished in cherry inlaid, including doors, sash linings and mouldings.

Rico sanitary hand straps are used over longitudinal seats, total of 21 are installed.

Ventilators are of Brill exhaust, four on each side of roof with grills on inside.

Headlining is of Agasote painted light cream color with railway enamel.

Removable window guards in four sections made interchangeable, are placed on devil strip side. This arrangement makes cleaning of windows easy. Hand brakes are the improved Lindstrom brake.

One special feature of these cars is the coloring of all bronze trimmings to an antique green, a serviceable and lasting color compared with highly polished bronze, which tarnishes after the car has been running two or three weeks.

Painting of these cars is Winnipeg Elec. Ry. standard light cream color above belt rail, below belt rail painted a solid cherry, sash and doors a natural cherry.

Trucks, air brakes and motor equipment are being supplied and installed by the Winnipeg Electric Ry. Co.

The accompanying photographs give a good idea of the general plan and appearance of these cars.

Service-At-Cost a Fair Basis

The Government Commission, which has been investigating the affairs of the New Brunswick Power Company, has made a report suggesting what practically amounts to a service-at-cost basis of agreement. The report sets the cost of the various properties at $2,800,000, as compared with $2,200,000 and $3,670,806 by the city and company estimators, respectively, and recommends that 7 per cent. be allowed on this amount after deducting operating charges. This would enable the company to pay bond and preferred stock dividends and have a small margin for common stock.

The service-at-cost idea is gaining in popularity and may conceivably be the solution of much of the trouble of electric railways and central stations operating under long-time franchises with fixed rates. No plant can give service at less than cost. In the end the public pays dearly for a poor service, cheating themselves under the mistaken notion that they are getting the best of the company.

Development of Freight Traffic on Interurban Lines

By A. B. Cole*

The transitory stage through which the electric railway industry is going at present should, if properly guided, result in that the refining process will be for the best. Managements are considering every angle of the operating question with the paramount idea of increasing revenue and reducing expenses to meet the rising costs. The skip-stop, the one-man car, and freight operation all seem to point a way to help keep the balance sheet clear of red figures. While the first two present more or less a purely operating problem, the success of the last is not only dependent on operation, but also business foresight, plainly speaking, salesmanship, in fact all that is embodied in merchandising.

The electric railway has a product to sell as well as any mercantile establishment, and that product or commodity is—transportation. We are speaking particularly of freight transportation, and to successfully market this commodity it is necessary that the electric railway protect itself by the use of a high grade sales or traffic organization.

The problem before the electric railway in marketing this commodity is the same as that of a manufacturer, who must break into the world market with a new product. He analyzes his field, and so must the electric railway in developing freight traffic. After proper analysis, the manufacturer launches an advertising campaign, backed by export merchandising knowledge of the particular field or fields to be exploited.

The electric railway has the plant, but in too many instances has said "They know we are here, why advertise our freight facilities?" In other words, the key to the situation is that the passenger mirage, which was the dream of the promoters of too many lines, has been permitted to delude business foresight and imagination. Further, this has resulted in the failure to recognize that transportation is a commodity which must be marketed.

Freight transportation, as a commodity to be marketed, must be considered from all angles in order that the electric railway will be most benefitted. Briefly these are:—

1—Law-Making Bodies
2—The Public at Large
3—The Shippers
4—The Electric Railway Operators
5—The Traffic Bureau
6—Service
7—Rates
8—Facilities

Usually when speaking of freight, we think immediately of the shipper. However, let us for the moment analyze a few of the other important factors that must be considered in merchandising this valuable undeveloped asset of the electric railway.

Law-Making Bodies

Many lines throughout the country are suffering from unjust restrictions imposed by national, state and municipal authorities. By proper cultivation, and some missionary work, these should be made to see that the electric railway is for the people, and performs an economic duty inseparable from the good and welfare of those served. It seems the paramount duty of all railway operators to be active in Chambers of Commerce, and in fact in as many business organizations as possible, so that the business public will find that the electric railway operator is a real human, and that there is a personality behind his business.

The Public at Large

Make the public think the "electric way" and they all will soon realize that their freight is delivered with despatch, and often at a more convenient point than by other agencies. In other words, advertise your service—not rates. Why has the motor truck been able to so completely interest the public. Aggressive and effective publicity surrounded the motor truck with a "Veil of Romance," and hitched patriotism and service in the same team, making them almost inseparable. The electric railway needs only to tell its story and keep telling it from the standpoint of service. The electric railway has a reason to exist for it has benefited the life of more communities than any other industry and needs to make no apology for its existence.

The Shippers

These need to be fully informed of the freight service in all of its ramifications, and also told of the service that is backed by proper facilities, handled by an experienced traffic man, who knows how to sell freight transportation.

The Electric Railway Operator

In many instances, it is the attitude of the management to think only of passenger traffic, and permit the freight possibilities to go undeveloped. Thus, in many organizations it will be necessary to arouse interest in "freight service" before any appreciable results may be expected from the people. If the people fully grasped the economic value of the electric railway to them, they would compel their representatives in national, state and municipal governing bodies to enact legislation that would permit the electric railways to serve the people to the fullest extent of their ability and not expect the electric line to comply with many of the unnecessary and burdensome restrictions of interstate commerce rules. There is no more reason for forcing many electric lines to comply with these regulations than there would be to compel all newly established auto truck freight companies to do so.

The Traffic Bureau

The sale of freight transportation can be most effectively accomplished through the institution of an aggressive traffic organization. In turn, this organization must be supported by effective advertising. The traffic that is developed must be properly handled in order to be held. This is only possible through the co-ordination of all freight handling facilities in a community or territory supported by proper co-operation of all railway managements involved in a network or through-routing. It is here that the well-paid traffic manager is a valuable investment, for he must not only look after the development of freight business, but also see that day in and day out there is no break in the service. The freight solicitor proper should be used with considerable discretion. Usually he is of the order-taker type, having only a general knowledge of rates, and knowing little of the elements which make the service. In most cases the results of the experienced traffic manager's personal efforts are so singularly superior, that solicitors are not needed.

Service

The electric railway is in a position to give service superior to that of its competitors, but unfortunately has failed to tell the public in a convincing way about this service. The electric railway excels in time of transit and in the handling of merchandise or despatch freight. While many lines have developed considerable l.c.l. business, the most profitable, the car-load remains undeveloped to any great extent. Were the handling of bulk freight developed, the revenue derived would greatly increase that now received from the l.c.l. freight, which is the most expensive to handle.

Few lines handle sufficient cars in one train to justify the tonnage at the rate received. Much of the freight handled by the electric lines is of such a character as to take a high class rate and is delivered in small quantities at the minimum supply. In this connection, it is evident that an analysis must be made to determine what classes of freight should be solicited in order to even up the revenue conditions, or to eliminate the tremendous amount of freight minimums. All of this must be sold as "service" and when transportation is marketed on its merits, the rate charged will be secondary with the shipper.

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*Westinghouse Electric & Manufacturing Company

Rates

Generally speaking, electric lines have waited for the steam roads to take the initiative in obtaining increased rates. Considering the principle of rate-making broadly, the electric railways have rarely fought for a special rate based upon the superior service rendered. Proper publicity and constructive work by the traffic departments often would convince the public into paying the higher price that better service deserves. Early morning delivery of overnight shipments and accessibility to stations entitles the electric railway to a differential wherever speed is the essence of the contract. Some utility commissions and chambers of commerce appreciate these inherent reasons for higher rates. Often electric service is worth 25 per cent. more than steam service to the same destination. It is here that sales or traffic methods are required to market the superior product of freight transportation, building up more business and increasing revenue regardless of steam rates. In time, the whole steam rate structure will have to be revised.

Facilities

In order to secure and handle freight business, confidence must be inspired in the shipper. Proper facilities are necessary. Not only rolling stock, both motive power and trailing, must be provided, but terminals and station layouts, according to the character of the business to be handled, including passing and industry tracks at way-stations. In many cases it is necessary for the company to assist in locating grain elevators, coal yards, lumber yards, stock yards and loading chutes, and sometimes these can be located on the railway's property with long term leases.

Two things in the way of facilities that seem to stand out paramount and must be accomplished before an extensive electric railway freight service can be profitably and flexibly instituted in the various states, both for inter-state and intra-state traffic, are the standardization of freight rolling stock, and the pooling of trailing equipment. The pooling system particularly applies to the handling of inter-line trailers, of which there is a drastic need at present.

One of the things which has made possible the extensive development of freight interchange on the steam railways has been the flexible working of the interchange pool which, as you all know, was operated up until government control, on the per diem basis. Therefore, some particular method will have to be adopted by the electric railways in order to more extensively develop interline traffic. This applies especially when the question of long hauls comes up, as for electric railway freight service to be of great value, there must not be any restriction as to destination as long as there is a pair of "electric" rails, reaching to points far and wide. And further, this would be adhering to one of the fundamentals of economical freight operation, which is to keep freight on its original wheels as long as possible.

Sell Transportation Like Merchandise

A careful study of the conditions in various parts of the country reveals the fact that the merchandising of freight service depends upon the same psychological facts, which are fundamental in the advertising and selling of any product.

The lack of merchandising of transportation among electric railways is so evident that authorities in other fields comment on it.

In this connection some very significant points were brought out by the Traffic Service Bureau of Chicago as to why steam railroads should not advertise freight service. Some of the reasons given are as follows:

1. Freight advertising is not necessary because the shippers are pretty wise as to what we have to offer, and we have other means of reaching them with special information.

2. It would involve immense expense, which would be useless if all the roads advertised—for the advertising of one road would offset that of another.

3. Advertising in journals that reach shippers would bring about our ears a swarm of publications soliciting advertising to our great annoyance, and to the end that we would make enemies of those in which we did not advertise.

4. Freight advertising, while it might get for an individual road some business that it otherwise would not get, cannot create freight traffic.

5. While there is no absolute agreement or rule among the railroads against freight advertising, still we are pretty well agreed that it would be a bad policy, and for one of us to start would create an unpleasant competitive situation.

Most of these reasons are unsubstantial and apply only to the new unified operation of the railroads. It would be wasteful for one line of a system to try and attract business from one of its other lines. But it is wrong not to inform the public generally on the matter of the quickest and best route to market its goods and tell them whom to see when in trouble and where he is located, etc. Such matters are appreciated by those who understand the use and value of advertising as a business force. One thing that advertising will do for the electric railway is that there can be shown, through proper methods, that there is a personality behind the freight business.

This personality should be so predominantly brought out in the advertising as to insure the shipper that his interests will be served to the best.

Getting Markets for Farm Products

With the education of the farmer by the Bureau of Markets, pointing out to him the different mediums of advertising through which he can best market his product, this Bureau cites the farm publications as standing alone, being able to perform a most important duty towards the farmer. It is here that the electric railway can do much good for the industry, because the electric railway can run constructive advertising copy calling attention to its published pamphlets, schedules and general information along with articles describing briefly its facilities at hand for serving the various communities affected.

In view of the fact that a large number of the farm papers are more or less localized to certain sections of the country, covering only a few states, it is easily possible to find a medium that will effectively cover a railway's territory thoroughly.

In some cities, the steam railroads go so far as to provide a terminal where farm products are shipped to certain commission brokers who are present daily at these terminals, from which the produce is sold to local dealers or in many cases reconsigned. This same scheme is possible in the electric railway field, where there is any demand for extensive distribution of farm products. The fallacy of the purely farmer's market in many cities has too often proved a failure to require any further comments at this point, other than that attempts to use the electric railway for handling produce to such markets generally have been expensive and in many cases unsatisfactory, unless it is possible to move all goods by carload lots.

Manufacturing industries present great possibilities for development of electric railway freight traffic. These in-

(Continued on page 40)

The Contractor-Dealer

Toronto Contractors Adopt the Open Price Plan—In Future will Exchange Information Freely—Will Raise Status of Profession

The first meeting of the Open Price Committee of the Toronto Electrical Contractors' Association was held in the Board of Trade Building, on March 5. The following members were present: Messrs. McIntyre, Kay, Gray, Hicks, Rohleder, Myers, Ramsden, Drury, Cruise, Salisbury, S. Wood, Groome, B. L. Clark, E. E. Clark, Rooks. Two members only were absent—owing to unavoidable circumstances. The Open Price Plan was thoroughly discussed, but the members present were not quite unanimous as to the advisability of a free exchange of prices. As a consequence it was tentatively decided to go ahead with the plan, omitting the "Exchange of price" feature. Since the meeting, however, the matter has been further discussed. Among others, Mr. Harry Alexander,, of New York, a strong advocate of the Open Price Plan, as practised in that city, who was visiting Toronto, gave the benefit of his experiences. The result is that most of the objections have been cleared away and the whole question will be reopened at the next meeting of this committee, when it is thought the original plan will be adopted without change. In the meantime the original motion stands and tenders are being filed in the office of the "Open Price" secretary.

The chairman of the Association, Mr. Kenneth A. McIntyre, is spending a few days in New York and will return primed with information to lay before his committee on the 20th. This meeting is called for 11 a.m. at the Board of Trade and will continue through the luncheon period. All members of the Open Price Committee are expected to be on hand.

Western Men are Again Reminded to Make Their Plans for the Vancouver Meeting

Electrical men in Western Canada are again reminded of the announcement made in our last issue about the big convention to be held in the city of Vancouver, on May 26th and 27th. Mr. W. L. Goodwin and Mr. S. A. Chase will be on the programme, and it is expected that an enthusiasm for co-operation will be aroused among the Western men equal to that displayed by Ontario men during Mr. Goodwin's recent visit to Toronto.

The only thing that can prevent this convention being a big success is the non-attendance of the members. If Mr. Goodwin once gets them comfortably seated before him the rest is, so to speak, merely a "procession." It was so in Toronto. Manufacturers, engineers, central stations, jobbers, contractor-dealers—all came to scoff—but remained to co-operate. It has been so, we understand throughout the cities and States to the south of us, wherever Mr. Goodwin has had an opportunity of explaining his plan.

The West is, of course, handicapped by wider distances and comparatively sparse population, but that does not hinder the success of the Goodwin plan of co-ordination and co-operation. On the contrary, it is an argument in its favor, in that the greater the isolation, the greater, in general, the need of assistance. Further, Mr. Goodwin's talks in Toronto opened up visions for the industry that few of us had had the hardihood to dream of before. He not only sets the goal, but he tells us how to reach it.

You are again reminded that you will best lend your assistance by writing direct to Capt. W. J. Conway, Secretary B. C. Association of Electrical Contractors and Dealers, at 406 Yorkshire Bldg., Vancouver. Tell him you'll be there and, in the meantime, offer your assistance to organize your district, so that you may be 100 per cent. represented at Vancouver on May 26 and 27.

Mr. Groome Displayed and Explained Benjamin Goods

An interesting feature of the March 6th meeting of the Toronto Electrical Contractors' Association was an address by Mr. Frank T. Groome, sales manager Benjamin Electric Company, assisted by Mr. F. J. Allen, manager of the company, and Mr. Faran, factory superintendent. Mr. Groome had prepared a fine display of Benjamin goods and specialties, and his talk was decidedly educative for the majority of the members. We learn that it is Mr. Groome's idea to visit other contractors' associations from time to time and place before them the salient features of Benjamin goods, illustrating, so far as possible, with actual samples. This plan must have appealed to all the Toronto contractors, as a great time-saver both for themselves and for the company.

We Need a Better Organization for Selling Appliances

The need of the electrical industry at the moment seems to be a better organization for selling electrical appliances. It is felt that the dealer is not saturating his territory or even approximating that condition. This fact largely accounts for the hardware men handling electrical appliances; he realizes the possibilities of development and knows, in a general way, how to bring that development about. It is difficult to believe that this is more than a transitory condition, however. The hardware man has no sympathy with electrical goods beyond the profit they bring him; nor has he any knowledge of the principles underlying their operation which make these appliances so desirable. If the electrical contractor-dealer will only take on the responsibility which seems his, both by training and experience, as well as logically, the business should naturally revert in his direction in a very short time.

One of the features of merchandising which the contractor-dealer has been rather slow to take full advantage of is the splendid "helps" in the way of general publicity, show cards, folders, etc., so frequently supplied by manufacturers and jobbers. He does not realize that nationally advertized goods sell themselves, practically speaking, because the demand has been created by advertising of which he gets the benefit—for almost nothing. Such an instance has just come to our attention. It is a letter sent out by a large Canadian jobbing house, drawing the attention of the contractor-dealer to a list of some fifty electrical specialties which are being featured in the advertising of this company. The letter points out that this company is advertising these specialties in a special way and that in addition they are being offered at a price which yields a very fair gross profit.

The conclusion seems perfectly plain. An unadvertised article is to-day too expensive to compete with those to which wide general publicity is given. It seems useless then for the dealer to do other than follow the path of least resistance and biggest profits, save himself the trouble and expense of a good percentage of his advertising and, as a result, leave himself more time to concentrate on increasing his turnover. Little by little the various elements in the electrical industry seem to be settling down into their proper groove and performing their proper functions. General advertising is surely the function of the manufacturer and jobber. It is only by fulfilling his own proper function—doubling and trebling—that the contractor-dealer can take his proper share in rounding out the industry.

Hamilton Electrical Contractors Are Going Strong with 28 Members

On March 3rd, at the Royal Connaught Hotel, a meeting of the Hamilton District Electrical Association was held. Ten new applications were received, making a total membership of 28 members. Four members of the Brantford Electric Club were present at the meeting and gave very interesting addresses with reference to the results which have been obtained through co-operation in the Brantford District. At the close of the meeting a hearty vote of thanks was moved to the members of the Brantford Club. Mr. Lyons, the president, replied very fittingly, wishing the officers and members of the Hamilton Association every good wish for their future success.

Arrangements are being made for a large meeting to be held in the Royal Connaught Hotel, on March 19th. Invitations are being sent to every electrical man in the Hamilton district to attend this meeting. Mr. Frank Groome, sales manager of the Benjamin Electric Mfg. Co., is going to address the members on the products of the House of Benjamin. Mr. K. A. McIntyre, chairman of the Ontario Association of Electrical Contractors and Dealers, will attend the meeting and address the members on association matters.

The convention of the Lighting Fixture Dealers' Society of America in Pittsburgh on Feb. 10 and 11 was responsible for bringing two new trade associations into existence. Among those attending the convention were representatives of leading fixture manufacturers and manufacturers of illuminating glassware. These two interests organized associations of their own while in Pittsburgh—the National Council of Lighting Fixture Manufacturers and the Illuminating Glass Manufacturers' Association.

Shade Holders—Folder by the Harvey Hubbell Company of Canada, Limited, illustrating and describing Hubbell Shade Holders for standard and Mogul sockets. These holders are designed to grip the socket more securely than the ordinary holder and to hold securely regardless ot jarring, vibration or weight of shade.

Mr. Lorne C. Webster has been appointed president of the Quebec Railway, Light, Heat & Power Company, in succession to the late Sir R. Forget. Senator D. O. Lesperance, of Quebec, is the new vice-president.

How I Increased My Sales 100%

One of the most perplexing problems, which confronted the Nation in 1917, was the fuel problem. What could be done to conserve fuel and yet save time and money? This is best told by the result of concerted effort and the practical application of our new thought "Save by Wire" and in presenting it to the public.

The immediate necessity of selling electric heating appliances, etc., was quite apparent, and the resolve made that a heating device campaign should be put on as soon as competent men, appliances, etc., could be obtained. This was all arranged in four weeks, and by August 5th the campaign started, featuring the electric flat iron, toaster stove and percolator. The first week's sale resulted in over 500 sales, and by the time the fourth week was finished, we had piled up the magnificent total of 2,306 pieces sold. This did not include any sales made by the regular staff in the salesroom, but only bonafide orders taken by the campaign crew. The articles were all sold at list price, and totalled more than $16,000.00 with a total connected load of approximately 1,500 hp., and with the sales made in the office by the regular force, the total amount was $19,633.00, or 1,520 hp.

The especially pleasing feature of the campaign was the fact that the number of telephone orders received in response to our advertising appeals was so pronounced, neighbors complaining that their friends did not order one for them, and if it was not too late, would we send one at once to them, etc., which was always cheerfully done. The daily sales averaged over 100 pieces for the 21 working days, the number in the campaign crew was ten. The devices were sold on the basis of $1.00 down and a $1.00 a month, which appealed to more than 80 per cent. Fifty per cent made the initial payment with the order, on the others first payment was C. O. D. It required extra help to make the deliveries, but in trying out two girls with the regular driver of a Ford delivery truck, good progress was made and few cancellations were made. No fuss was made when anyone wished to cancel an order; it was cheerfully done, and by this method, we found that may reordered what they had cancelled. The campaign instead of leaving things quiet as is usually the case after a Christmas rush, has given the heating appliance business a tremendous boost, and the daily sales are far better than they were before the campaign was put on. Our customers are glad of the opportunity they have had, and the practical use that can be made of these appliances. Altogether we feel that we have accomplished a great deal in a city of approximately 56,000 people, and the people feel that we have given them an opportunity and they appreciate it. The easy payment plan is the only way to put on a campaign of this kind and make a success of it, and to those who are not afraid of the vast amount of extra work it entails to those actively engaged in the sales and accounting department, we would recommend such a campaign, but it means that you must co-operate with the campaign crew, and give the necessary impetus to such a movement. Newspaper advertising was featured throughout the campaign and the total pieces sold given in large type. Telephone orders were received thus "Send me one of those 721 toasters" which was the first number announcing that 721 housewives of our city had taken advantage of the special easy payment plan and had helped "Save by Wire."

A by-law will be voted on, on April 5th, in York Township, authorizing expenditure of $200,000 to provide Hydro-electric service for the township, including purchase of present distributing equipment owned by the Ontario Hydro Commission.

Developments in Electrical Merchandising

By W. L. Goodwin*

Now a word about intensive development of present fields. The opportunities are unlimited. But it is too big a job for one concern. We must all work together to get real results. We must expand the industry in undeveloped fields. Not more than fifteen per cent of the population of the United States enjoy the benefits of electricity, and not more than twenty per cent of the homes are wired. Are we going to be satisfied to see such a small percentage of the population of this country enjoying the benefits of electricity? It is your job to give these benefits to humanity. Why should you not go out into the hills of New Hampshire and Vermont and see to it that the little farmer there enjoys the benefits of electricity. Why should only we of the big cities enjoy convenience and economy in electricity? Out in California we wired the farms. The development temporarily netted a loss. The central stations clubbed in and ran a line out so that these farmers could develop their country. The people in the cities paid the loss in carrying electricity to the farmer. Most of us, however, are so busy chasing the almighty dollar that unless we can get a dollar and a half for every dollar we put in, we don't move. We ought to appropriate five million dollars to develop the industry. We think nothing of giving the Red Cross and a lot of other organizations money. Why not give five millions dollars to develop this industry so the Society for Electrical Development won't have to get down on its hands and knees and beg for two hundred thousand dollars a year to advertise the industry. The Wrigley Chewing Gum Company spent $1,400,000 last year advertising chewing gum and we can't get $500,000 a year out of the whole industry.

The efficiency of the electrical organization is about 21 per cent. We spend most of our time patting the other fellow on the back. The competitive pace, and the unfariness of competition with which we have to contend doesn't permit of very much human efficiency. You can determine efficiency of the workman, but if you paid the heads of the business on the measure of their efficiency, they wouldn't get sixty cents a day. Who can take Mr. Smith and measure his efficiency? We just camouflage our jobs, and I know because I have done it myself. We have got to get the brains of this business to work to develop its efficiency.

You can't develop a plan locally. And you can't do anything national until the men get together locally, and you can't get men together locally as long as each fellow prefers to stay in his own backyard and hold on to all his little advantages. I attended a convention in Cleveland recently, and there wasn't a single thing said about what was going to be done the next year. Let us get together and talk about things that we are going to do next year and the year after. Most of our conventions have been gatherings of a lot of men who constitute themselves a mutual admiration society. We have got to turn up some real constructive ideas and put them to work.

Merchandising Methods Must Be Improved

There should be improvement in merchandising methods, better display, and the encouragement of more retailers, by urging present contractors to open retail stores, thereby enlisting the support of central stations and offering a broader and larger outlet for manufacturers. Our present neglect in this respect is almost criminal. The various groups should know where they stand and the lines that each handle. You make money when you sell goods, but the electrical industry thinks it makes money when it buys goods. We have the highest selling expenses of any industry in the country. As middlemen, our function is to get the product to the consumer. If you want to buy phonographs or pianos you go to a certain man who sells that particular article. But in our business, you don't know where to go. Our competitive system of doing business is at fault. Our salesmen are of the cheapest kind. The average salesman in the electrical business is mighty glad if he can make $150 to $175 a month. Anyone can go out and sell cheap clothes and make $5,000 a year. The salesmen in the electrical business have no chance to develop their ability. The system is all wrong. Brains play a very small part in our selling policy. Instead of the salesman going out and doing real creative work he goes out on highly competitive work. On the Coast I employed salesmen to go out and show contractors how to sell goods to the next man. When I held an annual convention I brought all the contractors from around the country to attend my sales meeting and paid their expenses because they were a part of my sales organization and sold my goods in the local communities.

When a woman buys an electric iron for six dollars she wants a life guarantee on it. But if she buys an automobile for $2,100 she expects to scrap it in three years. The central station tells her to bring her iron back if it doesn't work right and they will fix it up for her, and will probably give her about nineteen dollars worth of repairs on a six dollar iron. We haven't educated the public, as the automobile industry has, to scrap our appliances after a certain length of time. Our customers expect our goods to last forever.

My plan recommends the sale of high-grade electrical material; the establishment of high-class specialty retail shops. It is almost pitiful to go round the country and see the places called electrical shops. You have some beautiful stores in Worcester; Springfield has two or three. In Boston the ones I saw were shameful. There is no present inducement for a man to put a lot of money into a store. There is no encouragement for a man to go into the electrical business, and that is why we have no good stores. We must do everything possible that will encourage electrical distribution. The more points of contact we make with the public the more we relieve the central station of its burden.

Service and Compensation

My plan recommends recognition of the service functions of the contractor-dealer, and recommends a price differential when this service is performed. Under present conditions there is an everlasting battle between the jobbers and contractors. I am not trying to precipitate a trade row, but it is up to the jobbers and contractors to get together and settle a lot of things.

Quality Production

One of my planks reccomneds the sale of high-grade electrical material; the establishment of high-class specialty retail shops; improved specifications in wiring installations; and the introduction of liberal use of convenience receptacles. I think that any electrical man that knowingly buys a poor grade of material and misrepresents it to the public ought to be cast out of the trade. I recently saw some Japanese Christmas lamps that were mislabeled as to voltage. That should not be permitted. The best we can get is none too good and we always ought to try to elevate the standard instetad of buying cheap stuff. I have seen snap switches that you could actually crush in your hand. If you want that kind of junk, keep after the manufacturer for it and he will soon supply you with sockets that you can sell for a cent and a half apiece. The only thing that has kept the standards up (no credit to the four divisions of the industry) is an outside institution, our guardian angel—the Board of Underwriters.

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* From Address before Massachusetts Contractor-Dealers

Buy the best you can, don't fall for a cheap line of junk. There are toasters now that sell for ninety cents. Think of it! One fellow starts cutting prices and then you keep after manufacturer until he gets something out that is a disgrace to the industry. Every year the automobile manufacturers make something better but you try to get the eeltric manufacturer to make something cheaper.

Education of the Public

Another plank recommends broader education of the public with respect to the problems of the electrical industry, and with further respect to electricity, its uses in the field of household operations. When you buy a phonograph, watch or any other article of merchandise, you will find some instructions for the use of it. But do we even go out and tell the public about our articles? We leave them in ignorance. Naturally something happens the woman thinks she is being imposed upon and sometimes she is. We must take the public into our confidence and tell them all the ramifications of the electrical business in simple language which can be readily understood. In that way only shall we ever secure the public's confidence. We have got to tell the public about our industry, and remove the shroud of mystery that now envelopes it.

Intensive Sales

Another of my planks recommends retailers applying intensive sales methods in connection with small devices used in home, factory office, etc. (such as washing machines, vacuum cleaners, dishwater electric ranges, electric heaters, household heating devices, sewing machine motors, fans, lamps, portables, fixtures, vibrators, hair dryers, ice machines, etc.). This plank needs no explanation.

Live and Help Live—The Basis of Peace

By S. A. Chace*

I do not believe that the merchandising end of the electrical industry as a whole has done sufficient serious thinking; if it had we wouldn't now be in the absurd position of not having a definite plan to propose whereby all classes of the industry would understand exactly what their respective functions are and confine their efforts and regulate their business and create sales policies accordingly. In other words, the industry has no definite, universal plan of merchandising.

The average salesman in the electrical industry has not been a serious thinker; on the contrary his principal endeavors have been to get customers, hold customers, get more customers and sell goods at a profit, and let someone else do the heavy thinking; but I believe the experienced salesman can come nearer telling us the real route to true merchandising than anyone else on the pay roll.

The experienced jobbing salesman knows the value of the contractor-dealer to the jobber, to the central station, and to the customer as a retail distributor, and the manufacturer's salesman of experience also appreciates the values of the jobber as a wholesale distributor.

But, gentlemen, I am wondering: Is the electrical industry educated up to that point where it is ready for a definite plan of merchandising?

Are there not in the industry at the present time still some manufacturers who consider the jobber and the contractor-dealer unnecessary evils and who prefer to "sell direct and save the middleman's profit?"

Are there not some amongst the contractors and dealers who prefer to eliminate entirely the jobber and endeavor to purchase direct, although the jobber has endeavored to co-operate? And so they lock horns over the trifling percentage and upset trade conditions, greatly to their own loss.

Are there not jobbers also, who, when selling at retail and often to the contractor's customers, totally disregard the service rendered by the contractor?

Are there not also manufacturers and contracting engineers who look upon the consulting engineer as an interloper and endeavor to destroy his usefulness and profit in the business by preparing plans and specifications for which they make no charge?

Old-Fashioned Way

Are there not some so-called manufacturer's salesmen who are of the class who usually keep their desks locked because they fear their associate salesmen will secure information, and who in a narrow old-fashioned way, endeavor to sell everything direct, eliminating everyone else but themselves, and who have not as yet learned the true lesson of merchandising, of selling through the legitimate and natural channels of distribution?

Just as long as the experienced salesman is obliged to sell true merchandising to his employer, whether he be a manufacturer or a jobber, just so long is an educational plan necessary.

If there are also still amongst us central stations with a policy so blind to the necessities of the public, to their own profit, to others in the industry, and to adequate distribution as to retail electrical supplies without regard to the cost of merchandising and without considering the services rendered by the contractor, proper educational methods are still necessary.

If there are still amongst us men of influence and authority in any of these various classes so blind to the light of true merchandising as to clog the wheels of progress of the industry as a whole, I fear we are not yet ready for a definite plan, because they would not accept or follow a plan which would safeguard the best interests of all classes in the industry, and considerable educational work is still necessary.

I do not want to convey the impression that progress has not been made towards true merchandising, because I feel that wonderful educational progress has been made, especially during the last two years, but what I do wish to emphasize is that if there are still in the industry men of importance and influence responsible for sales policies, who, through lack of experience or false conceptions of the proper merchandising methods for the distribution of electrical supplies or who have not yet learned the true gospel of live and help live, then, gentlemen, there is still a necessity for much educational work in which we should all participate before the attitude of mind is ready for a definite plan and a just peace to properly protect all classes in the industry.

Progress in Two Years

I referred just now to the fact that wonderful progress has been made, especially during the last two years. The reason why I said this was because it was about two years ago when I first heard Mr. Goodwin state his views in a speech before your National Association at New Orleans, and he has awakened the entire industry as it was never awakened before. For the first time in the business life of many of us, we are seriously considering the merchandising problems of all classes in the industry. Before that many of us, including myself, were drifting along—manufacturers, central stations, jobbers, contractor-dealers and salesmen alike, in a self-satisfied way, disregarding business ethics, the rights of others and our own best interests (if we only knew it) in a mad rush for business.

The interest, enthusiasm and results already obtained through Mr. Goodwin's efforts have aroused all branches of the industry, so that for the first time all classes in the industry are asking each other "What sales policy or plan shall I adopt?" and if in your opinion the entire industry is sufficiently educated to appreciate and follow true merchandising methods is it not, gentlemen, therefore, for us to formulate a definite plan?

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*Before Massachusetts Electrical Contractor-Dealers.

It is just as necessary for us in the electrical business to have a definite and just plan as it is for all nations in order for them to have a universal and just peace.

Plan for Price Differentiation

Following the inspiration of Mr. Goodwin and realizing the necessity for a definite plan Mr. J. J. Gibson of our company, has prepared a plan of "Price Differentiation on the basis of Quantity and Service" which, in my opinion, is the only fair and just method which will properly safeguard the best interests of all and justly recompense each transaction according to the service rendered. This plan has been submitted to all classes in the industry, and criticisms and suggestions have been requested—in other words the plan has been put up to shoot at, in the hope that through the suggestions and criticisms offered the plan will be made perfect.

The manufacturer, the central station, the jobber, the contractor-dealer and the consulting engineer should each prepare a plan of merchandising which, in the opinion of each, is the right plan from his standpoint, and then submit it to the others for consideration. It may be that each will have to give up a little to the others in order to make the plan a just one—for unless a plan is just and safeguards the interests of all it will not last, and of necessity must have the support of all in the industry.

It is only necessary to attend such meetings as these to fully appreciate this wonderful wave of enthusiasm which has spread over the entire industry. Jobbers, manufacturers, central stations, contractors, consulting engineers, as well as the electrical press, are all interested as never before, and all are apparently in the proper attitude of mind to preach the gospel of "Live and Help Live." It seems as if we are on the verge of accomplishing something wonderful but lack something to enable us to hit the target and make a bull's-eye. Perhaps each class in the industry is too selfish, too indifferent and too cold, and lacks the proper amount of affection for others in the industry. Perhaps we are all too suspicious. Perhaps the difficulty lies in the fact, as I have pointed out before, that we have no definite plan of merchandising which covers the distribution of the products of a manufacturer to the ultimate consumer, and that such a plan of economical and efficient merchandising, safeguarding the interests of all, is all that is now necessary to produce perfect harmony and stability throughout the entire industry.

The lack of serious thinking in the past is not confined to the merchandising end of the industry alone, but to all departments and in all branches and amongst all classes of the industry. In the mad rush to put electrical goods on the market sufficient serious thinking and consideration of all the various problems affecting the supply, demand, and sale have not been given.

Take for instance the sale of household appliances. Did you ever stop to consider and realize that not one kitchen or dining-room out of ten thousand is properly wired and equipped to enable the house-wife to easily and safely use the electric coffee percolator, the electric toaster, or the electric iron?

Few Homes Properly Wired

The average kitchen has but one electric light fixture with one lamp, and it is necessary to take this lamp out of the socket in order to connect up the iron; the average dining room has four lights over the dining-room table, and in order to use the percolator or toaster it is necessary to disturb these lights and suspend cords, which are unsightly, and take time and trouble to connect. And I will venture to state that many of you and your friends have, therefore, abandoned the daily use of these appliances and they are now used principally as ornaments on the dining-room sideboard.

Has any manufacturer of heating appliances devised for the contractor a standard and inexpensive device within the reach of the average salaried man—one which will pass the fire underwriters, which, when installed, would enable the housewife to easily use household devices? No! But they will all urge you to sell the appliances, and yet the way has not been shown so the various devices can be easily and safely used. If some standard method and device is devised and sold through the contractor, the result would be an enormous increase in the sale of the appliances and a big increase in profitable wiring for the contractor.

The contractors in many localities have not been alive to the opportunities presented, or there would be established retail stores in shopping and residential districts enabling the consumer to purchase electrical appliances, lamps and other supplies easily. Now that many central stations are desirous of having incandescent lamps sold through the contractor-dealer, the lack of proper stores and proper distribution is a serious handicap to this movement.

But as I have stated before, wonderful progress has been made, especially during the last few years, and if we keep up this gait great achievements will be obtained and proper and efficient merchandising methods will be devised which will safeguard the interests of all in the grand orchestra of the industry.

What the National Association Stands For

The Ontario Association of Electrical Contractor-Dealers is in affiliation with the National Association of Contractors and Dealers of the United States and, as affiliates, the members of the Ontario organization, as well as the contractor-dealers throughout Canada, will be interested in knowing more about the functions and activities of the United States association. These are clearly outlined in a recent issue of Contact by Mr. W. H. Morton, general manager of the National association and we reproduce in part below:

The National Association of Electrical Contractors and Dealers now includes all retailers of electrical merchandise, regardless of their business, and the association is now on a broader and better basis than ever before as it now binds the state, district and local associations more closely together as a whole for the highest possible standard of co-operation.

The electrical industry needs immediate plans for procuring statistics and data in order to map out a proper procedure for bringing about the desired movements. And these problems need the study of all branches of the business if we would have ultimate success. The industry must first be placed on an economic and efficient basis by providing the time necessary to collect statistics and data needed for an intelligent study of its problems.

Second—From the information collected determine a policy that will be fair to all, a policy which provides for proper compensation to all who render any service of value.

Third—To provide funds for proper publicity mediums in placing said policy before the entire industry.

Fourth—That the first three can only be accomplished by the real co-operation of all branches of the electrical industry working toward the distribution of all forms of elec trical material from the manufacturer to the consumer in the most economic and efficient way.

There is no progressive industry today without its trade organization, and the strength and activity of such associations are the standards by which an industry can be judged.

Facts About the Association

The formation and method of operation of the National Association is given below in the forms of questions and answers.

Why Has This Association Been Formed? To promote the greatest possible co-operation between manufacturers, jobbers, contractors, central stations and all retailers of electrical materials, enhance the welfare of its members and to aid the maximum development of the Electrical Industry.

Who Is Eligible to Membership? Any person, firm or corporation engaged in the business of electrical contracting or repairing, or who installs electrical apparatus or sells electrical supplies at retail, this being the principal part of their business.

Who Is Eligible to Associate Membership? Any person, firm or corporation who installs electrical material or who retails electrical merchandise, such forming a minor part of their total business.

Is a Manufacturer Eligible? Yes, if he sells any goods at retail; that is direct to the consumer, such as motors, vacuum cleaners or other electrical goods, which are the product of his factory.

Is the Jobber Eligible? Yes, if he sells goods at retail.

Is the Central Station Eligible? Yes, if it sells electrical merchandise to its consumers and the general public.

Can the Hardware or Department Store Become a Member? Yes, if such store sells electrical supplies at retail.

Is a Fixture Manufacturer or Dealer Included? Yes, provided such firm sells goods to the public at retail.

Is the Motor Repair Shop Eligible? Yes: the business of dynamo and motor repairs, rentals and sale of new and second-hand machines are all essential parts of the retail sales in the electrical industry.

What Is the First Thing a Firm Does to Become a Member? Makes application to the District Secretary. If the District is not yet organized, apply to the State Secretary. If your State is one of the few yet unorganized, or if you do not know the name of the District of State Secretary, apply to the National Association of Electrical Contractors and Dealers.

What Is the Organization Plan of the Association? The country is divided into four "Divisions", Atlantic, Central, Pacific and Canadian, consisting of the States or Provinces in each of these geographical sections. Each state or province has its own State Association and the various cities or groups of towns form District Associations.

Dues Are Equitable

What Does It Cost to Become a Member? Initiation fee $10.00 and dues of from $5.00 per year up, according to the annual volume of business, for the National Association, plus the rate of dues of State and District Associations. It is necessary to become a member of the District and State Associations in order to join the National Association.

Are the Dues for Associate Members the Same as for Members? Yes, and said dues are calculated on the gross sales in the retail electrical department of their business.

What is the Universal Data and Sales Book? A loose-leaf book with leather cover, published at an original expense of over $4,000 and kept up to date by new sheets being mailed constantly. It contains the latest list prices and documents, with manufacturers' name, description of articles, catalogue number, date of issue, for nearly every article sold, including list prices on rubber covered wire from 13 cents to 45 cents bases, inclusive. This book also contains electrical engineering and contracting data, wiring symbols, wiring tables, illuminating data, reprint of National Electrical Code, etc., and a complete list of members of the National Association, listed by States.

Is the Universal Data and Sales Book and Renewal Sheets Furnished Free? Yes; one copy to each member and associate member without charge, and additional copies at cost price.

What Has the Jobber to Gain by Membership? He will meet his contractor and retailer customers, assist in developing them as electrical merchants, and will immediately benefit by the increased sale of his own goods to these contractors and retail customer, who will be better credit risks, and a far greater volume of business will be obtained for all through this systematized co-operative effort.

How Will the Hardware or Department Store Benefit? Associating with the jobbers and retailers at business meetings will teach them the particular needs and problems of electrical retailing, resulting in wiser sales policies, greater volume of business and better satisfied customers.

Will the Central Station Benefit by This Membership? They certainly will. It is the greatest opportunity ever offered them to assist in a scientifically organized plan to develop their own business; a plan on a sound business foundation, which will create harmony in all branches of electrical endeavor, making new friends and boosters for the central station in every territory.

In What Way Will the Fixture Dealers, Motor Repair Shop and Others Benefit? Organized effort will discourage ruinous competition and create new customers within the association. Intelligent discussion of sales methods and cost accounting will mean dollars gained and dollars saved.

Where Do the Benefits to the Contractor-Dealer Come in? Most important is the value of meeting and working with (not against) your competitors. Membership in the District, State and National Associations provides this great opportunity.

Information of inestimable value is sent out from the National Headquarters very frequently.

Liability and automobile insurance for members is provided and has resulted in 25 to 40 per cent being returned on annual premiums.

Uniform Proposal Sheets and Universal Estimate Sheets are furnished that prevent errors and omission in contracting work.

A splendid bookkeeping system for contractors and retailers is furnished to members at nominal cost.

Plans for the Future

The National Code Committee will act for any member desiring to appeal from an inspector's decision, and the other committees are acting at all times in their interests.

Our industry is now in a state of evolution. The most serious problems in its history confront us. If the business of the electrical contractor and dealer is to be preserved and made a factor in the commerce of the country, we must prepare to form a constructive part in the councils which are determining our status in this important period following peace.

Many of the rulings which have been made by the War Industries Board will form a basis of future practice. Far-reaching changes in the manufacture of the materials we use and their installation are contemplated. Our advice is sought and expected in the solution of problems which will vitally affect the future of our business, and such advice can only be given through a National organization.

If you ask **"What do I get out of it?"** we say, **"a liberal return on the small amount you put in" as organized effort, properly supported by those in the industry, will eliminate waste and duplication of effort.**

Beating the Pirate

By Sidney Neu

There is never a gathering of contractors and dealers without a defamatory discussion of "the pirate.". Certainly, prices should be maintained, wiring jobs should be figured with ample allowance for overhead and profit, but it can't be done—"the pirate" gets the business.

The pirate, according to the Standard Dictionary of electrical terms, is a third rate wireman, calling himself an electrical contractor, having an office located in his headgear, who buys some of his materials second hand and steals the rest, considers the Underwriters' rules as a thing to be avoided, if possible, and evaded where necessary, skins the job to the bone and hasn't even sense enough to make a profit out of the extras, and whose shoestrings are just sufficient to keep him two jumps ahead of the sheriff—for awhile. Should this delectable individual really cause worry to a legitimate business man? Is he so strong that the legitimate contractor must descend to his level to stay in business?

Although it is not generally known, there are or have been "pirates" in every line of business. When John Wanamaker started in business there were hundreds of peddlers peddling in Philadelphia. Did John follow their tactics, selling his wares for as much as he could get? He did not; yet John Wanamaker grew and the peddler quit. We still see occasionally itinerant vendors of collar buttons, shoelaces and suspenders, yet the legitimate haberdasher can afford to pay his rent. The legitimate clothier is prosperous in spite of the bargain sales of the department stores.

There are obvious reasons why these legitimate stores survive their pirates. They have something to offer which the public values that the pirate cannot give, and they impress this on the public continuously by advertising. Their advertising creates so much business that there is plenty for them after the pirate has snooped off his little chip.

The legitimate electrical contractor-dealer, if he is really "legitimate," has something to offer that "the pirate" cannot give:

1. He gives honest merchandise and materials, the best obtainable, which is a point of extreme importance in electrical work which remains installed for years without attention.
2. He has a store where the customer can pick out the fixtures to suit himself and not be disappointed by getting what he paid a cheap price for.
3. He can give sound advice as to the number of lights and outlets needed in every room.
4. He knows where to place his outlets to give the user the greatest possible convenience so that the job does not have to be done over.
5. He follows conscientiously the safety rules of the Underwriter, giving a generous protection against fire.
6. He carries an ample stock of materials so that the job is never delayed.
7. He employs careful workmen who do not damage flooring, woodwork, or anything else.
8. He guarantees his work and his materials, and his guarantee is worth something.

He has a place of business where he can be reached in case anything goes wrong or additional work is required.

The main reason the public patronizes "the pirate" is because the public does not realize these things. The public will never know unless the public is told, and the cheapest way to tell the public is through advertising.

All Electrical Men in Western Canada

Manufacturers, Jobbers, Dealers, Central Station Men,
Contractors, and all interested in the Electrical Industry

TAKE PRELIMINARY NOTICE

that under the auspices of
the B.C. Association of Electrical Contractors and Dealers

A Gigantic Electrical Convention

will be held in the CITY OF VANCOUVER on

MAY 26th and 27th Next.

The Chief Speakers will be

W. L. GOODWIN and SAMUEL A. CHACE
Author of the Goodwin Plan

Every electrical man in the Western Provinces is urged to take a hand in this monster Electrical Gathering. Wives are specially invited.

In order to get on the mailing list drop a card to the Secretary, 406 Yorkshire Building, Vancouver B.C. Then "Boost" for 100 per cent. representation from your own district.

Coin-Operated Automatic Photographing Machine Which Completes a Picture in Sixty Seconds

A coin-operated automatic photographing machine which has a magazine capable of holding one hundred sensitized plates at one filling is being marketed by the Wm. Gent Vending Machine Company, Cleveland. The whole operation is under electrical control, and a completed picture is produced in sixty seconds. When a silver dime is dropped in the slot an electric circuit is completed which starts a motor. Then a metal plug is forced in between the two coin springs, which takes up the circuit, allowing the coin to drop in the cash box. Next, the plate is ejected from the under side of the magazine and dropped down behind the lens and a long cam forces the plate against a flange so as to secure accurate alignment and distance. Another cam then throws in the arc lamp switch which is immediately followed by a cam which opens the shutter momentarily (the shutter opening can be set to take care of fluctuation in voltage). After exposure the plate is dropped into a lead pan and the one solution developer and fixer is squirted on it, filling the plate to the rim as the plate is lying face up. All this is done in ten seconds. In another forty seconds the plate is acted on by chemicals, washed and then ejected through a large slot in the front of the machine, from which it is taken and placed on an electric dryer. The motor of the machine is provided with a friction governor which is set for the particular voltage on the line on which it operates. All the action described is entirely automatic. This machine produces a perfect photograph in one minute, for one dime.

Oil Testing Cup

The only known satisfactory method of determining the insulating value of oil is to measure its dielectric strength by means of a spark gap immersed in the oil. Various devices requiring a comparatively large sample of oil and a rather high voltage for their successful operation, have been used for this purpose. Consequently there has existed a distinct demand for a device that would give reliable indications with a minimum sample of oil and with a relatively low testing voltage. A device for this purpose has been developed by the Westinghouse Electric & Mfg. Co., and is shown in Fig. 1. This new design uses a moulded construction, so that the cup proper is all in one piece, and therefore, is simple, rugged and compact. Fig. 2 shows this cup with electrodes removed and dismantled. The moulded part contains two brass electrode bushings threaded to receive the packing gland. Back of each packing gland is a small amount of cotton packing, such as waste, which prevents oil leakage around the electrodes. The bearing surfaces are reamed to receive the electrodes, which it is claimed guarantees perfect fit and exact alignment. The electrodes are made from a cylinder one inch in diameter, threaded at one end to receive the lock-nut. Binding posts are placed on the outside end of the electrode to attach the leads from the testing transformer. A steel feeler gauge for setting the gap at exactly 0.10 of an inch, is attached to one of the binding posts, when not in use. The device has a cup shaped interior to contain the oil substance to be tested, and the construction allows thorough cleaning without disturbing the gap setting. The feeler gauge is concealed within a hole in one electrode. It is claimed that the whole testing cup is light, compact, and convenient. It weighs only 6½ pounds net, with dimensions of 8½ inches by 4 inches by 4¾ inches, and requires only a four ounce sample of oil. The maximum voltage required for reliable testing is 25,000 volts. Higher voltages may be used if available, but it is seldom that higher than 30,000 volts will be required to discharge across the standard gap (0.10 of an inch) through any insulating oil.

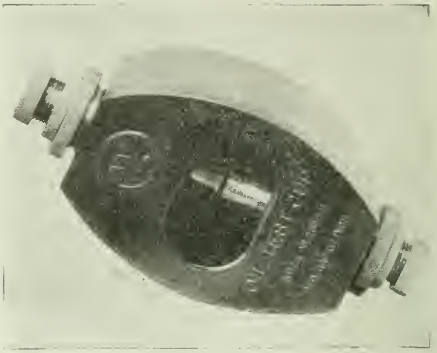

Fig. 1—Oil testing cup assembled

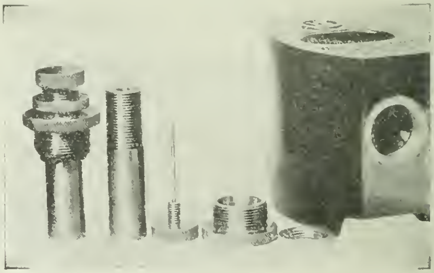

Fig. 2—Oil testing cup showing parts

In spite of the strenuous opposition of the Montreal Light, Heat & Power Company, the Private Bills Committee of the Quebec Legislative Assembly has given power to the city of Verdun to levy a tax up to two per cent. of the value of the poles, wires and other equipment of the public utility companies using the streets of the city.

A Commutator Resurfacer

For many years it was taken for granted that when a commutator started to spit and spark and showed evidence that it was in need of being dressed up, the only thing to do was to shut down that equipment, remove the commutator and turn it down on a lathe, or temporarily tide over the trouble by using sandpaper. If any thought was given to the labor this required and the loss of production by taking so much power out of service, we figured it was merely part of the day's work or a necessary evil. Experiments to determine a short cut finally brought forth a non-conducting composition which, when molded and hardened, presented a continuous abrasive surface that by simple contact with the commutator while in motion, would cut down the mica, ridges and bars—easily and quickly. Every conceivable test was made and the high expectations were justified in all instances by results obtained. This device is known as the Ideal Commutator Resurfacer. The resurfacer is not limited in its application to commutators, but may be used equally as well on a.c. collector rings. The same appliance does the work on one just as readily as on the other. The Ideal Resurfacer is manufactured and supplied by the Ideal Commutator Dresser Co., 4 So. Dearborn St., Chicago.

Fuse Sizes for Industrial Motors

The proper size of fuse for a motor is only too often obtained by the chief electrician or one of his repairmen by haphazard methods. The motor's normal operating current is given by the maker on the name-plate, but fuses are properly selected of a larger capacity to allow for starting and for momentary overloads. Hence it is rather more usual for the maintenance man to select his fuses "be guess and be gosh," with a view to their permanence in service rather than the safety of the motor they are supposed to protect.

In order to give a practical working idea of what sizes to use, the Westinghouse Electric & Mfg. Company has prepared the accompanying tables. These are based on the following assumptions as to size of fuse required to stand starting current without blowing:

Type	Times Fuse Load Current at Starting
Polyphase Wound Rotor	1¼
Squirrel Cage (thrown on line)	3
Single-Phase Repulsion Induction with Rheostat	2
Single-Phase Repulsion Induction without Rheostat	4
Direct Current	1¼

Since the fuses for squirrel-cage and repulsion motors without rheostats are, respectively, rated at 3 and 4 times full-load current, they give practically no overload protection. Hence it is recommended that double-throw switches be installed, connecting the motor through fuses of 1.25 times full-load rating (as under Wound Rotor sizes) for running and through the regular heavier fuses or direct to the line for starting.

3-Phase Squirrel Cage Motors

H.P.	Fuse Rating (Amp.) When Voltage Is 110	220	440	550
½	12	6	3	2
1	20	10	5	4
2	35	20	10	8
3	50	30	15	12
5	90	45	25	20

2-Phase Squirrel Cage Motors

H.P.	Fuse Rating (Amp.) When Voltage Is 110	220	440
½	10	6	3
1	20	10	5
2	35	15	10
3	45	25	15
5	80	40	20

Direct Current Motors

H.P.	115v.	230v	550v.
1	10	5	3
1½	15	8	3
2	20	10	5
2½	25	12	6
3	30	15	6
3½	35	15	6
5	50	25	10
6½	65	35	15
7½	70	35	15
8½	85	45	20
10	90	45	20
11	100	55	25
12½	110	60	25
15	125	70	30
20	175	90	35
25	225	110	45
30	275	125	55
35	325	150	65
40	350	175	75
50	450	225	95
60	550		110
75			150

3-Phase Wound Rotor Induction Motors

H.P.	Fuse Rating (Amp.) When Voltage Is 220	440	550
5	20	10	8
7½	30	15	12
10	40	20	15
15	50	25	20
20	70	35	30
25	85	40	35
30	100	50	40
35	125	60	50
40	150	70	60
50	175	80	65

2-Phase Wound Rotor Induction Motors

H.P.	Fuse Rating When Voltage Is 220	440
5	20	8
7½	25	15
10	35	20
15	45	25
20	60	30
25	70	35
30	90	45
35	110	55
40	120	60
50	150	70

Type AR Single Phase Motors

H.P.	Without Rheostat		With Rheostat	
	110	220	110	220
2	80	40	40	20
3	120	60	60	30
5	200	100	100	55
7½	325	175	175	80
10	400	200	200	100
½	20	10	10	6
¾	30	15	15	8
1	40	20	20	10

Well-known Figure Passes

The electrical industry in Canada has suffered a distinct loss in the death of Mr. James Johnston, chief electrician, Department of Public Works, Ottawa. Death took place suddenly at his late residence, 16 Arlington Avenue, Ottawa, on Sunday, February 21. Mr. Johnston was first associated with the Edison General Electric Company and later with the Royal Electric Company of Montreal. In 1886 he installed the first electric light plant to furnish light to the Senate Chamber, House of Parliament, Ottawa, and continued for 33 years in the service of his country. All the electrical installations in Dominion Government buildings, from Victoria to Halifax, have been designed by Mr. Johnston, some of which are among the largest undertakings of their kind in Canada. Mr. Johnston leaves a widow and three daughters, all residing in Ottawa, and one son, Mr. J. A. Johnston, manager Public Utilities Commission, Brockville, Ont.

Mr. Keeling Sales Manager for Canada.

From special representative for the Province of Ontario to sales manager for Canada, is the record made in eight months by Charles H. Keeling, who has just been promoted to the latter position by the "Square D" Company. In the sales contest, inaugurated by this company last year, for the greatest increase in percentage of sales over a fixed quota, Mr. Keeling won the grand prize—a magnificent grandfather's clock. Mr. Keeling is now preparing for a sales trip to the Pacific Coast.

Mr. Chas. H. Keeling

Mr. McCallum Joins "Square D" Company

After years of experience in the electrical field, William R. McCallum has joined the selling forces of the "Square D" Company, of Walkerville, Ontario. He will work this company's Province of Ontario territory. Mr. McCallum was in the electrical contracting business, in Ottawa, for several years. During this time he completed some of the largest electrical installations in that city, as well as a number of government contracts throughout Canada.

Mr. Wm. R. McCallum

Obituary

Mr. George H. Olney, managing director of Eugene F. Phillips Electrical Works, Ltd., Montreal, died at his residence, Linton Apartments, Montreal, on March 2, aged 50 years. He had been in ill-health for a long time, suffering from hardening of the arteries, and about two years ago retired from the position, on the advice of his medical adviser, still retaining his seat on the directorate. A few weeks ago he resumed his duties as managing director. Mr. Olney had been connected with the company for twenty years, the success of the firm being largely due to his activity. He was a very hard worker, with a grasp on the many details of the various departments. Mr. Olney went to Montreal from Providence, R.I. The funeral service was held in Montreal on March 4, and was attended by representatives of the various cable companies and other electrical industries. After the service the body was conveyed to Providence. Mr. Olney is survived by his widow and a son and daughter. His son, Lieut. H. Olney, lately returned from active service in the Royal Air Force.

The Bell Telephone Co. has just occupied their new exchange at Collingwood, Ont. The common battery system has been installed.

Development of Freight Traffic on Interurban Lines

(Continued from Page 30)

dustries are located many times in centers of distribution so that carload shipments of products can be easily handled by the use of trailers to points on the electric line. This also holds good for large wholesale and distributing companies, for example, such as chain stores. In this case the main warehouse for a chain of stores may be located at some central point where the electric railway can handle all traffic to the various stores in the chain. This presents a continuous flow of traffic which insures the electric railway a profitable return, as most of this freight moves in large quantities, sometimes carloads.

Relation of Motor Truck and Electric Railway

Some of the more or less sane motor truck operators feel that the function of the truck is to act as a feeder to existing transportation systems, and especially to the electric railway, due to its rapid transit. Possibly, the ultimate solution of this problem lies in the regulation of the motor truck by the several states and in the use of the electric railway and the motor truck in one or all of three ways:—

One—The use of the motor truck as a direct feeder for l.c.l. freight to the electric railways.

Two—Through a system of containers let the motor truck operators be forwarding agents to the electric railway for freight collected from certain distribution centers to be shipped via the electric railway, similar to forwarding agents at seaboard.

Three—The motor truck in shuttle service between electric railway systems that are separated and requiring a link for a through freight route.

The foregoing remarks have been made with the intention of pointing out a few fundamentals that will have to be considered in developing freight traffic. While the question of facilities has hardly been touched there still remains much to be said on this subject, but the greatest action that is necessary in developing freight traffic is the provision for organizations for developing this traffic, backed by proper merchandising methods and aggressive salesmanship, based on public psychology.

POWER CABLE

350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

---

Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary Vancouver

Current News and Notes

Cobalt, Ont.

The Nipissing Central Electric Railway, connecting Cobalt, North Cobalt, Haileybury and New Liskeard, concluded the year 1918 with a deficit of $8,000 on the year's operations. Members of the board of directors are seeking to secure a fare increase of approximately 25 per cent.

Fredericton, N. B.

The receipts of the New Brunswick Power Company for the year ended December 31, 1918, amounted to $774,251.85, but owing to the fact that the operating expenses amounted to $612,002.49, as compared with $424,893.65 the previous year, there was only $69,159.94 net earnings to add to the surplus account.

Galt, Ont.

The financial report of the Galt Hydro-electric system for the year 1918 is the most satisfactory in the history of the department. The total revenue from all sources amounted to $108,536. Total expenditures, including interest on debentures, sinking fund payments and depreciation, amounted to $95,514, leaving a net surplus of $12,822.

Guelph, Ont.

Plans and specifications are being prepared, and tenders will be called, for two electric pumping units having a joint capacity of 3,024,000 imperial gallons for twenty-four hours, and a booster pump for fire purposes, for the city of Guelph. It is the intention of the city to install this equipment at the earliest possible opportunity.

Hamilton, Ont.

At the annual meeting of the subsidiary companies of the Dominion Power and Transmission Company, Hamilton, it was stated that there was a deficit last year of $535,000 on the Hamilton Electric Radial Railway, which runs from Hamilton to Oakville.

London, Ont.

It has been announced by the London & Port Stanley Railway that, commencing May 1, all employees will be given an eight-hour day and wages will be increased to a certain number of motormen and conductors.

Montreal, Que.

Booth Brothers, electricians, Montreal, Que., have dissolved partnership—Clarence D. Booth continuing.

It is reported that the Montreal Light, Heat and Power Consolidated contemplate a further reduction in lighting rates in the near future.

Gross earnings of the Southern Canada Power Company for January were $53,221, against $42,866 in January a year ago, an increase of $10,335. Operating expenses at $26,652 showed an increase of $3855, leaving net earnings of $26,569, an increase of $6478.

Ottawa, Ont.

The financial report of the Ottawa Hydro-electric System, just submitted, shows gross earnings of $263,410—an increase of about $9,000 over 1917. Total expenses amounted to $221,178—an increase of about $18,000 over 1917—leaving a gross surplus of $42,232, and a net surplus, after deduction depreciation charges, of $5,400.

The Dominion Railway Board have rendered a decision against allowing the application of the Ottawa Electric Railway Company for authority to increase its rates on the Britannia and Rockcliffe lines. The board holds that the company has been and is prosperous and well managed, and that the efficient management has resulted in large dividend earnings as well as a proper service. The decision is that the company has failed to show that it requires increased revenues. The board hopes and expects that costs will shortly decrease.

Port Arthur, Ont.

The finance committee of the city of Port Arthur has recommended that a by-law for the issuing and selling of debentures for $80,000 for the construction and improvements to the electric railway be passed, and that another by-law covering the issue of debentures for $20,000 for telephone work be also passed.

The Ontario Railway and Municipal Board recently met in Port Arthur to listen to a protest of representatives of the Trades and Labor Councils of Port Arthur and Fort William against the increase in street railway fares. The Board, however decided that the increase was quite in order and that they could take no action in the matter.

Regina, Sask.

Passenger receipts of the Regina street railway system for February show approximately an increase of $4,000 over the same month last year.

St. Thomas, Ont.

A citizens' committee appointed some weeks ago to devise means of placing the street railway system of St. Thomas under better and more economical management, has reported advising the adoption of one-man cars and a complete change of routing. A saving of $12,000 a year is estimated as the result of these changes.

Toronto, Ont.

It has been announced, although not officially, that work will shortly commence on the Toronto-London Hydro Radial Railway.

Windsor, Ont.

The Canadian Renulife Electric Company, Limited, has been formed to deal in the manufacture and sale of medical electrical appliances. The head office of the company will be at Windsor and the capital stock is given as $40,000.

Wingham, Ont.

Delegations from Teeswater, Wroxeter, Lucknow, Brussels, Belgrave and Blyth, Ont., recently attended a meeting called by the town council of Wingham, Ont., to discuss plans for securing Hydro extensions into these municipalities. A committee was appointed to wait on the Hydro-electric Power Commission and it is expected to secure immediate action.

York Township, Ont.

A Hydro by-law will be submitted on April 15 to the electors in York Township, providing for the expenditure of $200,000 to be used in buying out the existing lighting facilities in the township.

Mr. A .H. Foster, for the past eight years manager of the Guelph Radial Railway System, has been appointed manager of the Brantford Radial Railway.

W. C. Crawford, a prominent Chatham business man, and president of the Windsor, Essex and Lake Shore Electric Railway, died recently after a short illness.

The lines of the Detroit United Railways are to be taken over by the city, the price agreed upon being $31,500,000.

Lighting Fixtures—An attractive booklet by W. H. Banfield and Sons, Toronto, illustrating and describing the lighting fixtures manufactured by this company

Kraft Cord "Braiduct"

Made in Canada under Canadian Patent No. 147,057

This cut is reproduced from an actual photograph, and illustrates the behavior of the material in this rigid test—perfect flexibility. We cut the ends to show plainly the superior construction—note the high grade Canvas Duck Lining and the KRAFT CORD winding. This KRAFT CORD is made to our own specifications and is fire-proofed, which is entirely new.

KRAFT CORD "BRAIDUCT" is in a class by itself—superior to any imported conduit—is absolutely the last word in flexible non-metallic conduit construction.

We are now making our own insulating compounds, consequently every lot will be uniform in flexibility, and every foot is fished at the factory.

KRAFT CORD "BRAIDUCT" is easy to instal—easy to cut—easy to secure, as it is made in our own country, and easy to buy, as our price is right.

KRAFT CORD "BRAIDUCT" is packed in heavy fibre boxes, each box containing four coils (1,000 ft.), insuring product against damage in transit.

KRAFT CORD "BRAIDUCT" is regularly inspected and labelled by the **Underwriters' Laboratory** under the direction of the **National Board of Fire Underwriters** and every coil carries their label.

We will be glad to send you a sample.

The Flexible Conduit Co.

Limited

Guelph - Canada

Condensed Department

Publisher's Notice

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

ELECTRICIAN, experienced in the operation of hydro-electric power plants and at present superintendent of plant, would like similar position. Apply Box 888, Electrical News, Toronto, Ont. 6 9

Induction Motors Wanted

One each 15, 25, 35, 50 H.P., 550 volt, 60 cycle, 2 phase. Would consider other voltages or three phase. State full particulars and best cash price. Address Box 843, Electrical News, Toronto, Ont. 3 t.f.

For Sale

1 150 H.P. Corliss Steam Engine, made by Cowan & Co., Galt, Ont. Girder frame, left hand drive, side crank, 13' x 26" fly wheel.

Will sell at a bargain.

Full particulars on application to

Hydro Electric Commission,

5 t.f of St. Thomas, Ont.

Equipment For Sale

We have for sale the following second-hand electrical machinery in good condition, with accessories.

4 Grinder motors, 450 H.P., 250 R.P.M., starting electrical resistance, drum controller.

6 Water cooled transformers, 375 K.W., 12,000 volt primary, 440 volt secondary.

1 Paper machine motor, 125 H.P., 500 R.P.M., 440 volt.

1 Installation high tension cable

1 Paper machine motor, 100 H.P., 500 R.P.M., 440 volt.

1 Incoming line panel, switches, transformers, etc.

1 12,000 volt aluminum cell lightning transformer.

Delivered F.O.B. cars, Thorold, Ont.

Address: Natural Resource Corporation,
538 Gluck Building,
5 6 Niagara Falls, New York.

EQUIPMENT FOR SALE

Three only 250 K.V.A. single phase, 25-cycle, oil-cooled station transformers, mounted on trucks, wound 2,200 volts primary to 550 bolts secondary, and arranged for standard hydro taps, Moloney make; 2,500 feet 1,000,000 C.M. triple braid, weatherproof, Waco, stranded copper cable. H. Mueller Manufacturing Co., Ltd., Sarnia, Ont. 6

150 H.P. MOTOR FOR SALE

Immediate delivery, new, never used, 3 phase, 25 cycle, 550 volts, 500 R.P.M., with extended base, pedestal bearing, 34 inch pulley, slide rails, also with Cutler-Hammer drum type starter with resistance. Address—Hydro-Electric Power Commission of Ontario, 190 University Ave., Toronto. 6

Generator Set Wanted

Wanted to purchase 1-500 K.W. Motor Generator Set or rotary with the following: A.C. End, 2200 volt, 3 phase, 60 cycle. D.C. End, 250 volt, 2 wire. An alternative of 2-250 K.W. Machine would be considered. Machine to be complete with the necessary starting device, switches and switchboard rheostat and usual instruments.

Southern Canada Power Company, Ltd.,
330 Coristine Building,
6 Montreal, Que.

Effect of War on 1918 Central-Station Business

An interesting sidelight on the effect of the war on central-station business in 1918 is given by Alex. Dow, president of the Detroit Edison Company, in his annual report. He said in part:

Our sales of power to the smaller factories showed less than the average increase. On the other hand, our sales of power to the larger factories and particularly to those which promptly undertook war work, increased beyond the average for the year. Residence lighting, which is an important part of our business (175,967 residences were served in December and $3,188,512.65 earned by that service in the twelve months), likewise showed more than the year's average increase. This is due to an increase in the number of residences connected, and not to a commensurate increase in use by the average residence customer, who in 1918 was likewise asked by the government to practice economy of light and fuel.

The increase in sales of power to large factories was the result in a measure of their working night shifts and of overtime and Sunday work. The stoppage of overtime, etc., by government instructions after the signing of the armistice coincided with the removal of the Fuel Administration's restrictions on display lighting, so that there was no net resultant effect upon our December earnings, although the effect of each official order is clearly recognizable in the daily load curves.

Path Followed by Rupture in Steel Fusion Welds

From investigations made by S. W. Miller, the first evidence of strain in electric welds appears where visible defects may exist in the weld, such as film of oxide around the grains or around small particles of metal. Therefore, every effort should be made to avoid the formation of oxides. If there are no defects in the weld, the rupture is invariably along the grain boundaries. These conclusions apply to welds as made and not to those that have been heat-treated. Also, the path of rupture due to shock or alternating stress may possibly be different from that due to tensile stress. Since all brittle welds resemble each other in having more or less columnar structures and containing such impurities as pearlite, cementite and nitride of iron, it is possible that quenching may help remedy the trouble since it produces an entirely different structure.—Electrical World.

PETRIE'S LIST

of NEW and USED

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
2	52	3	25	550	720	Lancashire
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	30	2	60	220	720	Fbks.-M.
1	25	3	25	550	725	Westg.
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	20	3	25	550	710	Westg.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	15	3	25	550	710	Chap. & W.
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	Westg.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
1	6	2	66	220	1200	T. & H.
1	5	3	25	550	1440	Excelsior
1	5	3	25	550	1400	Excelsior
3	4	3	25	550	1400	Excelsior
2	3	3	25	550	1500	C. G. E.
2	3	3	25	550	1400	Excelsior
1	1	3	25	550	1400	Excelsior
1	1 6	1	60	110	3400	Diehl

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Generation, Transmission and Application of Electricity

Published Semi-Monthly By

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Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

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The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for $2.00 per annum. United States and foreign, $2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean, Limited.

Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

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Daily Press Not Fair to Public Utilities

No. 1 of "Public Service Topics," an interesting little sheet published by the Toronto Railway Company, has just come to hand. In initiating this course, the local company is following a precedent already established in a large number of cities on this continent.

There can be little doubt that the Toronto Railway Company are taking the right course and that the educational possibilities of such a publication, if widely distributed among the patrons of the company, must be very considerable. On the other hand, one cannot but deplore the necessity for it. Surely the facts regarding one of our biggest public utilities should be freely placed before the public by our local press, who are the natural medium through which such information flows. The attitude of the press towards privately-owned public utilities, however, is well known and the Toronto Railway Company has come in possibly for even a little more than its fair share of condemnation and vituperation. It is the easiest thing in the world to arouse public opinion against capital in any form and the Toronto daily press, during the past few years, have deliberately and systematically sought to create and intensify this feeling of animosity. No attempt has been made to place both sides of the transportation problem before their readers, but on the contrary, the press has been careful to say only such things as they felt the public wanted to read. They have followed, not moulded, public opinion and, to this extent, have degraded the function for which the press exists.

No further evidence of the truth of this statement is required than the fact that private corporations all over the continent have found it necessary to present their own side of the case through special publications similar to that of the Toronto Railway Company, mentioned above.

No one, however far removed he may be from the capitalist class, can deny that the cost of operating a street railway system has increased very considerably during the past four years. Is it common sense reasoning then to suppose that any railway system can sell service at the same rate as formerly? It is greatly to be hoped the general public will prove more fair-minded than the press, that they will read this "Public Service Topics" and give some thought to the situation. The transportation problem in Toronto is not at all a personal matter. It is a matter of getting better service than we are getting at present—for which the public, without question, is ready to pay a fair price.

Electric Combine—£5,000,000 Scheme to Command the World's Market

There has just been put into practical operation a scheme for the consolidation of a number of important electric and engineering undertakings. For the purpose of the scheme there has been formed the English Electric Company, with a capital of £5,000,000 in 1,500,000 £1 Preference and 3,500,000 £1 shares, of which about £2,000,000 has been issued, chiefly Ordinary shares.

This new concern has exchanged its shares for those of Dick, Kerr & Co., formerly represented in Canada, the Phoenix Dynamo Company and the Coventry Ordnance Company. The centre of the organization is Dick, Kerr and Co., which controls the United Electric Co. and Willans and Robinson, Ltd. Furthermore, it has a close alliance with Siemens Brothers, Limited, through an exchange of directors.

As to the policy of consolidation and expansion, the object is to assist the development of the business of the allied concerns in the provisions of all classes of electrical machinery, and especially large sized steam turbine generating plant.

Companies have been established in France and Japan to exploit the manufacturing rights of the group and local capital has been raised. The recent acquisition of the Coventry Ordnance Co. brought the group into relationship with John Brown and Co., and Sir Charles Ellis, managing director of John Brown and Co., will become chairman of the new company.

"Electrify-Your-Home" Movement

At a meeting held on March 12th, 1919, in the offices of The Society for Electrical Development it was the prevailing opinion of the attending representatives from the individual branches of the industry that a house-wiring campaign was needed and would be timely. The scope of the campaign includes the wiring of houses now built but un-wired, the wiring of houses that are contemplated or under construction, also a drive for the wiring of industrial and commercial buildings.

There were present at the meeting representatives of the central stations, contractors and dealers, jobbers, manufacturers—including fixtures, lamps, appliances and apparatus—the trade press and members of the Society's staff. It was brought out at the meeting that many central stations are carrying on house-wiring campaigns at this time. It was shown that it would be better to inaugurate the campaign at this time rather than to wait until the Fall or later, because such a stimulus is needed and desired by the industry generally. It was also the opinion that no better time could be selected for approaching the average house-owner prospect than right now. The statement also was made by manufacturer representatives that they did not believe there would be further reductions in material prices and that there was an uncertainty of labor wages decreasing. It was felt, on the contrary, that labor costs would be greater, thereby offsetting any possible reduction in material prices. Another important point brought out was that home owners and builders must be shown that they will not gain materially by withholding decision to wire or build their houses, and this will be a feature of the campaign. The campaign slogan "Electrify Your Home" was decided upon because of its greater scope; it appeals to house-wiring prospects and also to those for appliances and apparatus.

Six weeks was definitely set as the period for the campaign, the time being from April 1st to May 15th. The Society plans to have the material for the campaign in the hands of the industry before April 1st. House-wiring orders for the most part do not come into the store or shop unsolicited —the average house-wiring prospect **must be sold.** And the forthcoming campaign is built around this fact. The selling and advertising helps for use in the campaign comprehend every reasonable requirement. One feature is the portfolio which the Society will distribute and which will contain descriptions of all the sales and advertising helps, as well as explaining the what, why, when and where of the campaign—the "how to's" in other words. This elaborate portfolio will be sent free by the Society, upon request. The campaign materials include all necessary advertising illustrations, printed matter, slides and complete window trims. As in previous national campaigns, the majority of the material will be supplied free to members of the Society, and to non-members at cost prices.

The window trim, consisting of three pieces, i.e., one cut-out, one poster, and one streamer, will be printed in three colors. The lamp companies' representative agreed to purchase and distribute window trims, to their agencies. The representatives of the electrical press agreed to aid in every way possible in putting over the campaign. Representatives of the national electrical organizations and associations also are being depended upon to put their whole support and effort behind the campaign.

Government Power House at Lake Edward

The Public Works Department propose to construct a power house and laundry in connection with the Military Hospital Building at Lake Edward, P. Q. It will consist of a basement and one storey, with concrete foundations. The basement will contain coal bunkers in the rear, engine and dynamo and pump rooms and workshop at the right hand side, the central portion being used for the laundry. The dynamo room is to be separated from the pump room by a 9-in. brick wall, and the laundry will be cut off from the other sections by 14-in. brick walls. The first floor will contain another portion of the laundry, including the disinfection room, with stores and toilets. A high brick chimney is also to be erected, having a cast iron cap. The foundation, walls and beams, including the chimney foundation, are to be of concrete. The boilers are to be carried on girders supported by concrete piers.

The floors of the boiler room, bunkers, engine and dynamo room and pump house will be of 4½-in. concrete, with a wearing coat of 1½ inches thick. The floor and laundry roof over the bunkers will be of reinforced concrete. The main roof is to be covered with asbestos shingles, and the roof of the other portion with tar and gravel.

The power plant will consist of a 20 kw. 125 v., d.c. generator multipolar type, direct connected to a steam engine. The panel board is to be of the double branch type. The system of wiring will be designed for the parallel two wire 110 v., d.c. interior conduit system.

Electricity in the Glass Bottle Industry

Mr. G. Percy Cole, technical engineer of the Dominion Glass Co., spoke on "Electricity in the Glass Bottle Industry" at the Montreal Electrical Luncheon on March 12th. This subject does not look promising for the introduction of any humour, but Mr. Cole managed to amuse as well as to convey a large amount of interesting information. He was formerly in the electrical business, and speaking of the difficulties encountered, remarked upon the task of explaining the meaning of power factor to a "bunch of aldermen." But, he added, he did not know what trouble was until he got into the glass industry. He then by means of samples and a number of slides, described the process of making bottles by machinery and hand. The plants of his companies were electrically operated, using a large number of motors, mostly of the a.c. type, although it was necessary to use variable speed machines and direct current. Mr. Cole then enumerated the various motors which were installed, adding that storage batteries were also used to some extent, and with good results. The motors were used to operate unloading machinery, conveyors, crushers, gas producer plant, annealling ovens, fans, blowers, etc. For the glass industry it was not necessary to use motors of over 100 h.p. Experiments had been made with a view to using electricity for heating the annealling ovens, and he believed that they would obtain successful results. Experiments had also been carried out for melting the materials by electricity, but there were some serious difficulties to be overcome and he would not venture to prophesy success in this direction, enabling glass manufacturers to dispense with gas producer plants. So far no electric furnaces had been constructed which met with their requirements.

Electricity in Steel Rolling

The Electric Club of Toronto had a fine address on Friday March 21st, from Mr. E. S. Jefferies, chief electrical engineer of the Steel Company of Canada, who motored over from Hamilton, bringing Mr. Culley, Mr. Stalford and a number of other electrical men from that city with him. Mr. Jefferies described the electrical equipment of his company's blooming mill, particularly with reference to the large reversing motor which is capable of attaining full speed, from rest, in about a second and a half. It appears that electric drive in the operation of rolling billets into long beams is just about twice as efficient as steam drive—another triumph for electricity. In our next issue we hope to give Mr. Jefferies' address in full. It is safe to say that few lecturers have proven more interesting to the club. Mr. Kenneth J. Dunstan, the president, occupied the chair. Mr. P. A. Borden, as usual, very kindly assisted with the projections.

Small Hotel Plant

A small plant for supplying the Hotel Dieu, St. Basile, Madawaska County, N. B., is being installed, from plans by Mr. J. A. Roy, Montreal. A steam boiler is already installed in the hospital and a 20 h.p. engine is being set up to drive a 15 kw. generator. The supply of water is to be drawn from a stream 4,000 ft. from the site of the hospital, and situated on the other side of a hill 150 feet above the water level. The power from the steam plant will be transmitted to a motor in a small power house near the stream. The water which will drive a DeLaval pump, will be pumped into a reservoir from which point it will be carrried by gravity. The plant is also being used for lighting the hospital.

Electric Power from Swift Rapids Plant

A Combination Generating Plant and Ship Lift Lock—Current Supplied to Town of Orillia

The town of Orillia has been in the forefront of electrical development since the early days of the industry. During the 90's the town had a steam-driven lighting plant, used for arc lighting and incandescent service. This plant had been installed with what was then thought ample capacity, but it quickly became overloaded and about 1899 a proposal was made to utilize a water-power on the Severn River some 20 miles from the town. There were two possible power sites, one at the Big Chute and the other at Ragged Rapids. The head at Big Chute is 58 feet and at Ragged Rapids 47 feet. The latter site was decided upon and a concrete pier and stop-log dam built. For some reason the dam was located in the middle of the rapids instead of at the foot and a head of only 33 feet was developed.

A contract was awarded in 1899 to P. H. Patriarch for $65,000, this contract including the dam, powerhouse, machinery and transmission line to Orillia. The installation consisted of two single 40-inch water wheels with cylinder gates and two 300 kv.a., S.K.C., two phase, 1,200 volt inductor alternators. The cylinder gates were later changed to wicket gates. After considerable difficulties, mostly owing to absence of railway transportation nearer than sixteen miles at Severn Bridge on the G. T. R., the plant was placed in operation in 1901.

Three Dams Built

After operating with more or less success for about two years, the dam failed by undermining and a large portion of the middle piers fell into the river. The dam foundations had not been taken to bed rock in the centre, but were built on cemented boulders which seemed to be solid rock. No damage was done other than the loss of the head. Steps were immediately taken by the town to restore the dam and after some months a rock filled crib dam was built above the broken dam, including that portion of it in which were located the head gates and waterwheel penstocks.

This dam was in operation from 1903 to 1908. During the low water period in the summer, the leakage through this dam was so great that there was not enough to keep the plant in operation and so third dam was built, this one of reinforced concrete, a few feet down stream from the original dam, but still including the penstock and headgate portion of the original dam. This section was known as the gravity section to distinguish it from the new section which was hollow. Through the bottom of this section were placed five 60 inch Venturi sluice pipes of cast iron. There was also a pier and stoplog spillway with openings totalling 70 feet by 9 feet. With this dam the head available was 41 feet maximum.

In 1906 an extension was built to the power house to house a third unit, which consisted of a 1,200 h.p. 40 in. double runner Sampson waterwheel, direct coupled to a Westinghouse 600 kv.a. 1,200 volt, two phase revolving field generator, separate exciter and four 150 kv.a., 1,200 to 2,200 volt transformers. This increased the installation to a total of 1,200 kv.a.

The transmission line was a single circuit wood pole

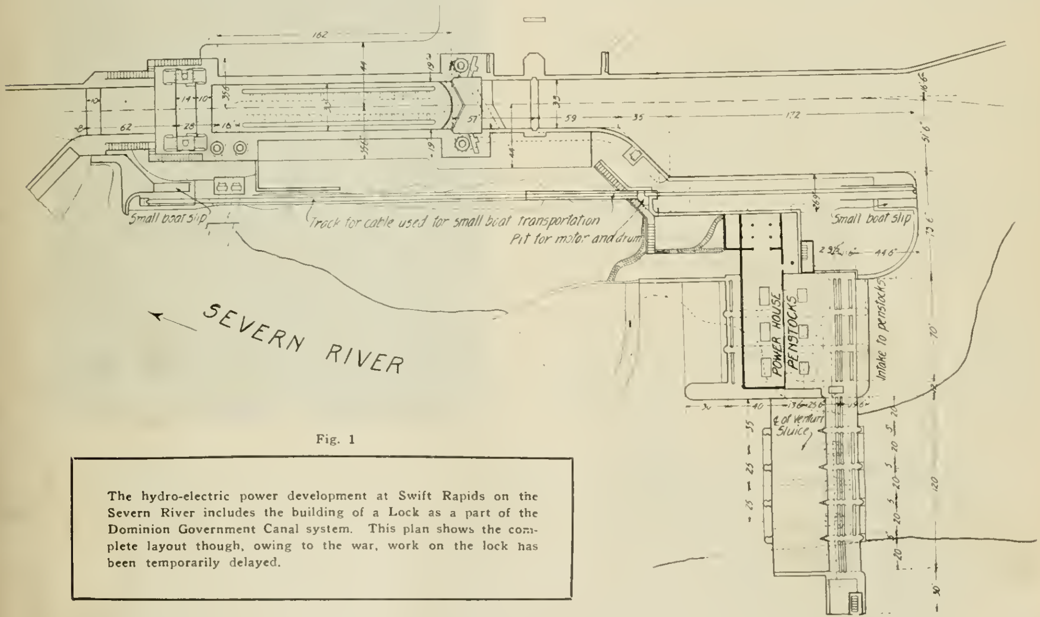


Fig. 1

The hydro-electric power development at Swift Rapids on the Severn River includes the building of a Lock as a part of the Dominion Government Canal system. This plan shows the complete layout though, owing to the war, work on the lock has been temporarily delayed.

line 19 miles in length; the poles were cedar, 30 ft. long and 8 inches diameter at the top, spaced at 104 ft. and carrying one two-pin crossarm and a ridge pin giving a 28 inch triangle. The conductors were No. 4 h.d. bare copper. A No. 10 iron wire telephone circuit transposed every 5 poles was also provided five feet below the high tension. The high tension conductors were not at that time transposed so that the telephone was always noisy.

Temporary Tie Line

Mr. Greenwood, shortly after his appointment as engineer in 1910, prepared a report on the power plant and, after investigation, recommended the construction of a new power house building and equipment to be located some 700 feet below the dam. Construction of this plant was actually under way when the Department of Railways and Canals intimated that the Severn division of the Trent Canal was to be proceeded with and that the town had better await developments and work was, therefore, stopped.

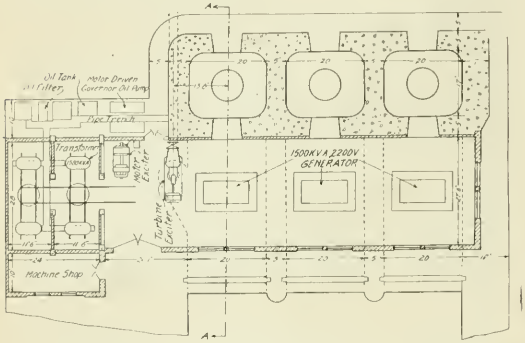


Fig. 2—Plan of power house, showing location of turbines, generators and transforming equipment

In order to tide over this period a contract with the Simcoe Railway and Power Company was entered into for a supply of power from the Big Chute plant. A tie line was accordingly built from the Big Chute to the Ragged Rapids, some 9 miles in length. This line was built in a 66 foot right-of-way over very rough country, mostly granite rock ridges and swamps. The poles were 30 ft., 7 in. top cedar at 120 ft. spacing, carrying two 2-pin arms, 4 feet apart, with pin spacing of 48 inches. Three No. 2 aluminium seven strand conductors were used on Ohio Brass Company 27,000 volt, 2-piece insulators. A 5-16 inch seven strand galvanized steel ground wire was strung on the tops of the poles to protect them from lightning. A No. 10 copper, h.d. telephone circuit was also strung. At the same time, 1911, a second transmission line was built from Ragged Rapids to Orillia. The same construction was used except that No. 2/0 aluminium was used for conductors. Telephone was transposed every five poles. The high tension conductors were also transposed three times between Big Chute and Ragged Rapids and nine times between Ragged Rapids and Orillia.

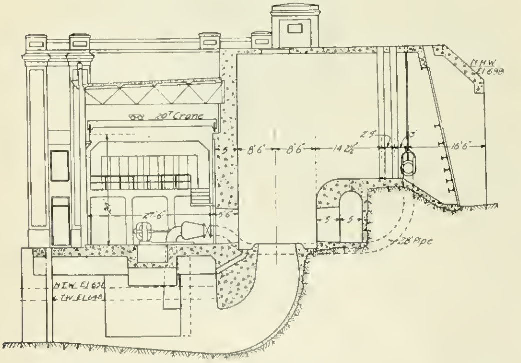


Fig. 3—Power house section—Exciter, turbine and generator shown

New Plant in Connection With Canal Development

When the plans for the Trent Valley Canal were finally adopted it was proposed in order to avoid heavy expense in rock cutting, etc., to pass the Ragged Rapids dam, to wipe out the Ragged Rapids dam and power house and to build a new dam and lock some two miles further down stream at Swift Rapids and to incorporate in the work a new powerhouse.

This plan was agreed to by the town of Orillia and a contract was awarded by the Department of Railways and Canals to the Inland Construction Company for Section 2 of the canal work, which included the Swift Rapids dam, lock and power house, and lockmaster's house.

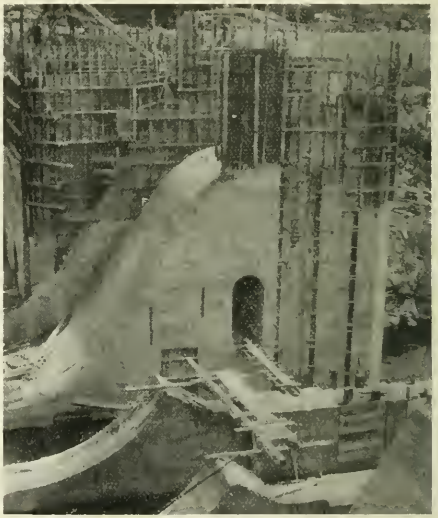


Fig. 4—Construction view of spillway, Swift Rapids dam

Fig. 1 shows the general plan of the work with the dam, penstocks, powerhouse and lock.

Fig. 2 is a general arrangement of the powerhouse, showing wheel setting, generators and transformer compartments on the main floor.

Fig. 3 shows a cross section of the powerhouse and penstocks.

Fig. 5 shows an elevation and cross section of the dam.

Owing to war conditions, the lock is still unfinished. This will be a single lock of 48 feet lift. It will be provided with one pair of mitering gates on the breast wall and a vertically operated steel gate on the lower end. This gate will be raised by operating machinery placed on a steel bridge which will be supported by reinforced concrete towers. The necessary height to give clearance to vessels means

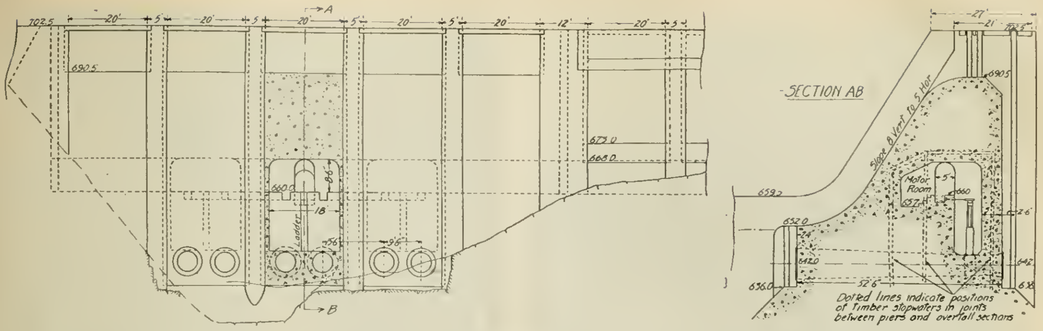


Fig. 5—Horizontal and cross section of spillway—Note Venturi sluices and inspection tunnel

that these towers will have an imposing appearance. The architectural features have not been overlooked.

Three Venturi sluices are built into the bottom of the dam, and for the purpose of unwatering them at any time stoplog checks are formed in both ends of the four piers protecting the ends of the sluices.

Small Boats Carried on Railway

To avoid locking small boats an electrically driven marine railway will be installed on the dam. It will be operated by a 20 h.p., 550 volt, 3 phase, 60 cycle motor. The estimated length of the railway track is 680 feet and it will be illuminated by 20 forty watt tungsten lamps or equivalent. The track will be carried on small concrete arches. Small boat slips will be built at each end of the railway.

Water for filling the lock will be drawn from the upper pool through a large culvert built in the rear of the south upper extension wall to valve chambers in the side walls of the lock above the upper gates, thence passing down shafts formed in the breast wall into a single culvert under the lock floor from which it will discharge into the lock through openings in the floor. The lock will be emptied through valve chambers in the culverts under the south wall in front of the lower gate, the water being drawn into the culverts through the openings in the floor.

The head of the lock will be protected by a movable dam consisting of a small deck girder bridge and steel stop logs.

The lock chamber will be 167 feet long and 33 feet wide between the faces of the vertical side walls.

The Dam

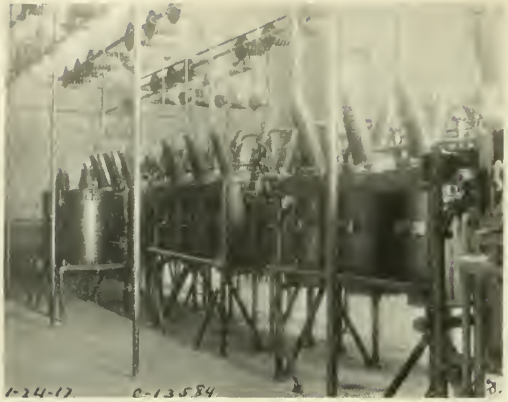
The dam is built across the river from the upper end of the south entrance pier at the upper end of the lock to the south shore, a distance of about 230 feet. The dam is divided into two sections, viz., a supply weir at the north end consisting of three sluices each 20 feet wide and 24 feet deep for the supply of water to the power house which is below the dams and a spillway 120 feet long by 60 feet high above the solid rock in the centre of the river. The crest is divided into sluices over which a reinforced concrete platform is built. Slots in the platform are left to allow of the operation of the stoplogs on the platform.

A travelling gantry crane constructed by the Herbert Morris Crane and Hoist Company has been installed to raise or lower the stoplog controlling the entrances of the power house wheel shafts and Venturi sluices when necessary.

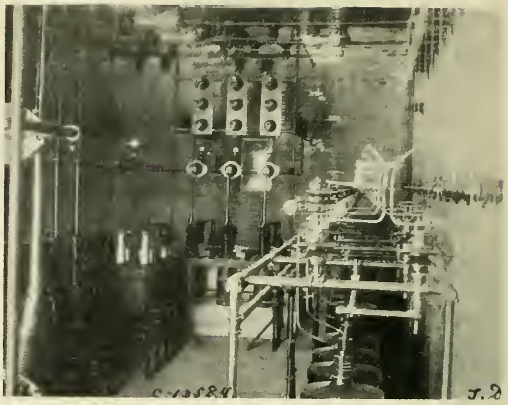
Water Turbines

These wheels were supplied and installed by the Boving Hydraulic and Engineering Company under contract dated July 4, 1916. The installation consists of three twin horizon-

Up-stream view of Swift Rapids dam, showing 5-section spillway on left and three turbine bay openings on the right.



Oil switches and overhead distribution, Swift Rapids, Severn River



Lightning arresters, spark gaps, choke coils, etc., Swift Rapids

tal turbines each capable of developing 2,120 b.h.p. under 45 feet head when running at 257 r.p.m. Each turbine has two runners with buckets of steel plate cast into the rim and hub, two guide cases with balanced movable vanes of cast steel bronze bushed and connected by short bronze bushed links to the regulating rings, and one draft chest of cast iron split horizontally and vertically and provided with two manholes.

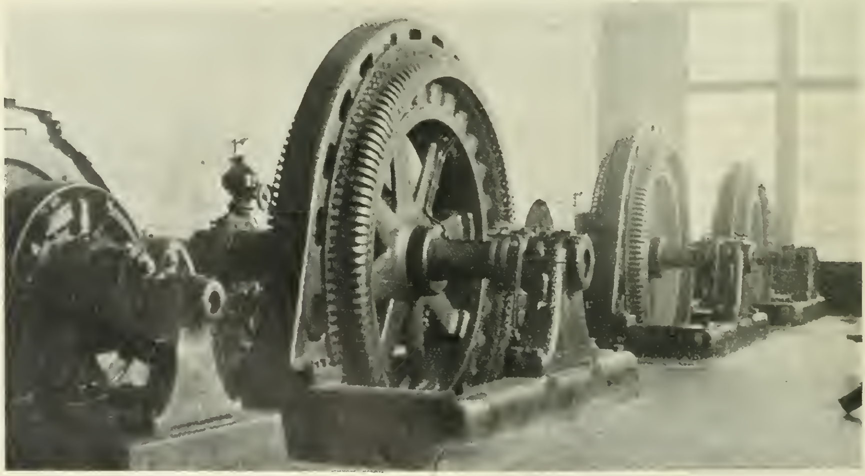
Two features of the turbines call for comment viz., a central bearing of lignum vitae type which is adjustable from the outside by means of bronze screws, and tightening boxes for the turbine shaft which is water sealed and requires no packing material, thus doing away with the wear of the shaft. The turbine shafts are 9½ inches in diameter and consist of open hearth steel. Each turbine weighs approximately 73,000 lbs.

The turbines are regulated by three automatic oil pressure Lombard governors, which are extremely sensitive and fitted with mechanical hand regulating devices which also allow hand gate adjustment when the governor is being disassembled.

For exciting current purposes there is a single horizontal turbine designed to the following data: Effective head 44 feet; maximum output 150 b.h.p.; normal output 125 b.h.p.; normal speed 700 r.p.m.

Generating Machinery

The work of supplying and installing the generating plant and switchboard was carried out by the Canadian General Electric Company. There are three generators of 1,500 kv.a., 257 r.p.m., 2,300 volts, 3 phase, 60 cycles, which are directly connected to the water wheels. They are of the revolving field type. Exciting current can be provided from either of the two d.c. generators which are equal in capacity. One is directly connected to a water wheel and the other is part of a three bearing motor generator exciter set. These



Electric generating equipment in Swift Rapids plant—Three 1500 kv.a. units two generators are interchangeable in all respects. They are rated at 83 kw., 690 r.p.m., 125 volts.

The induction motor which is connected to the exciter is 125 h.p., 720 r.p.m., 2,200 volts.

The stepping up transformers are three in number, each of 1,500 kv.a. and 3 phase. Taps on the high voltage winding allow for 25,000, 24,000 and 23,000 volts. They are water cooled core type and fitted with bell alarms and dial type thermometers. For power house and local services three 50 kv.a., 2,200 to 110-220 volt transformers are provided.

The switchboard is in a gallery above the level of the main floor and between the high tension room and transformer compartment. The panels are of natural black slate mounted on pipe supports. The instruments have a dull black finish and the board has a very neat appearance. The end panel is on a swinging bracket and holds the synchronizing indicator and voltmeters. This allows the operator to keep the instruments in view when at any part of the board and is a convenience when parellel operations are in progress. One feature of the switchboard that may be mentioned is a three circuit graphic polyphase wattmeter with reroll attachments. This instrument records the total load of the three generators.

The stepped-up current is conveyed through conduit from the ground floor to the third storey of the power house where the high tension bus is situated. There are three high tension lines (3 phase) proceeding from the building. Two are used for Orillia and the third as a tie line between the Swift Rapids plant and the Big Chute. One or other of the Orillia lines can be used for connection with the Wasdells Falls plant. Fore some time all three generating plants on the Severn River and the Eugenia Falls plant have been run in parallel, namely, Eugenia Falls, Big Chute, Wasdells Falls and Swift Rapids. The first three plants are operated by the Hydro Electric Power Commission of Ontario.

The Swift Rapids plant was first operated in November, 1917, and from that time to the date of the signing of the armistice the machines were loaded to full capacity. Owing to demands of munition manufacturers who were working night shifts there was practically no peak. Consequently, load factors ruled high and the average for 1918 was 72 per cent.

Mr. J. B. McRae, consulting engineer, of Ottawa, was responsible for the plans of the power house and plant. With him was associated his colleague, Mr. J. C. McLaren. The late Mr. W. K. Greenwood as engineer of the Orillia Water, Light and Power Commission and Mr. George Page, power house superintendent, were also intimately in touch with the work during both its inception and construction. For the information contained in this article we are indebted, in part, to the late Mr. Greenwood, and in part to Mr. F. Gover, secretary Orillia Water, Light and Power Commission.

Good Lighting Necessary at all Points

Our manufacturers have been somewhat tardy in seeing the beneficial side of good lighting. It is only lately that employers have recognized the fact that good lighting increases production and decreases accidents. Very often, however, good lighting is confined to certain sections of a plant. There are many places in factories, particularly in the ground floor of sawmills, where little or no attention is given to illumination. When it is realized that most sawmills in the Province generate their own electricity for lighting purposes, it is hard to understand the laxity displayed on the part of some of the owners and managers of these plants in not having sufficient lighting provided. In several cases the inspector had to be furnished with a lantern in order that a proper inspection could be made, notwithstanding the fact that electric generators form a part of the equipment of these plants.

An instance can be cited where from purely economic reasons sufficient lighting had not been provided, with the result that a fatality has to be recorded owing to that neglect.

In general, good lighting in factories and workshops not only facilitates the work direct, but is of the greatest indirect value because of the feeling of security given the workers. Such being the case, it naturally follows that the inspector, while making his offical visit, will carefully scrutinize the system of lighting in force, and numerous orders have been issued to install more lights at certain designated points.

While this department has set no standard for this very important provision, nevertheless we have at all times insisted that proper illumination must be provided.—From report of Inspector of Factories, Public Works Department, British Columbia.

Power Development at Drummondville

The Southern Canada Power Company has completed the construction of its new dam and power house, of concrete, at Drummondville, P. Q., and is now proceeding with the installation of the hydraulic and electrical machinery. Provision is made for four units, two of a total of 7,000 h.p. now being completed. The equipment includes two 3,150 kv.a., 60 cycle, 2,300 v., a.c. generators, direct-connected to vertical turbines, under a 32 ft. head. There are two 100 kw. 125 v., d.c. exciters. The transformers are 1,000 kv.a. oil insulated and water cooled, stepping up the voltage to 48,000. The consulting engineer is Mr. W. Kennedy, jr., Montreal. The electrical machinery is of Canadian Westinghouse make, the turbines, Boving Hydraulic & Engineering Co., Ltd., Lindsay, Ont.

Opportunity for Canadian Manufacturers

An important announcement has been made by the Secretary of State for the Colonies to the effect that all restrictions on imports into England from British Colonies have been removed. It is made clear, however, that this refers only to goods produced or manufactured in the Colonies.

It is pointed out, at the same time, that this offers a splendid opportunity for Canadian manufacturers, as British stocks, in general, are low. The announcement, of course, amounts practically to a preference in favor of Colonial goods. It will doubtless mean the establishment in Canada of numerous branch factories of United States and other foreign industrial concerns.

It Costs Money to Break Poles

A wireman was fined in the Toronto police court on Friday, March 14, for having deliberately pulled scrap wire into a conduit pipe. Such criminal violation of the wiring rules calls for a heavy penalty and the offender got it, being fined fifty dollars and costs for violation of the rules, forty dollars further which he must pay to the owner of the place for loss of time while the power was shut down, and a further sum of eighteen dollars to another wireman who was called in when the old wire short-circuited to make repairs.

The total operating revenue of the Western Canada Power Co. for 1918 amounted to $448,709 as against $450,161 in 1917. Operating expenses were $163,418 as against $130,559, leaving net operating revenue at $285,291 as against $391,601, a decrease in the year of 10.74 per cent. Other revenue brought gross income up to $294,079 against $331,794, an increase of 11.37 per cent.

Joint Committee of Technical Organizations Hold Successful Annual Meeting

The Third Annual Meeting of the Joint Committee of Technical Organizations was held in the Physics Building on the evening of Monday, March 24th. The chairman, Mr. Geo. A. McCarthy, presided. There was a large attendance of technical men. Three main items of interest composed the program—Mr. McCarthy's report and addresses by Mr. Tom Moore and Mr. J. F. M. Stewart. Mr. McCarthy outlined the activities of the Joint Committee for the past year as follows:

Annual Report 1918-1919

To the Technical Men of the Province of Ontario.

Gentlemen:—Your Committee has pleasure in submitting its third annual report covering activities during the year ending March 24th, 1919. The executive held about forty-five meetings during the year and twelve meetings of the general committee were also held.

Changes in By-Laws

The By-laws have been revised so as to separate the office of secretary-treasurer, and in future there will be a secretary and a treasurer to conduct the affairs of the committee. A further revision has been made so that the Joint Committee will now hold its meeting for the election of officers shortly before the annual meeting instead of immediately after.

Inventions

The work of the Inventions Committee was carried forward until the signing of the armistice, at which time activities of this committee were completed. The following letter from the Imperial Munitions Board to the members was very much appreciated.

December 26, 1918.

Dears Sirs:

Owing to the cessation of hostilities the work of the Inventions Committee of the Board naturally comes to a close. I am sorry Colonel Carnegie is not here to give me a clearer view of the unselfish work done by the members of the committee during these years of war. In his absence I must content myself with simply expressing personally, as well as officially for the Ministry, deep appreciation for the time and effort which you have given to the work of this committee.

With sincere regards, believe me,

Yours faithfully,
J. W. Flavelle, Chairman.

Questionnaire No. 3

It will be remembered that Questionnaire No. 3 which was distributed to all industries by the Honorary Advisory Council for Scientific and Industrial Research, was handled in that portion of Ontario west of Ottawa, by this committee. Final returns were made to Ottawa during the beginning of the year and the work of this sub-committee thus completed.

War Scholarships

During the latter two years of the war period, one of the most important functions of the Joint Committee was in connection with the supplying of technically trained men for war purposes. This function involved the securing of graduate engineers for active service overseas and of technically trained men for service under the Imperial Munitions Board in munitions plants. Being thus in close touch with various sources of supply for these classes of men, the Joint Committee in the cary part of 1918 was confronted with the following conditions:

Just previous to the outbreak of the war, the normal enrollment in the Faculty of Applied Science of the University of Toronto was 700 to 800. The enrollment in 1917 was 150, and the classes were subsequently very greatly reduced through enlistment.

In the spring of 1914, 145 men were graduated in Applied Science. The graduating class of 1918 numbered 23, and several of these were absorbed by the war before they could write on their examinations.

On the recommendations of the Joint Committee, three men were on one occasion removed from the chemistry course in Toronto University to take positions in munitions factories. They had only written their first year examinations, but the urgent needs of the war had to be met with such material as was available.

It was reported that early in 1918, the Applied Science classes at Queens were only one-fifth of normal, and that at McGill the conditions were quite as bad, if not worse. There was not a single student in electrical engineering at McGill at that time.

There were three phases of the very serious problem arising out of the above described conditions—first, the matter of supplying the then immediate need for qualified engineer officers; second, the supplying of the need of such men two or three years hence, if the war lasted that long as then seemed possible; and beyond this again the problem of supplying the very vital need of qualified engineers to meet the demands arising out of the "post bellum" reconstruction period.

In connection with this problem it seemed evident that the primary need was to stimulate, by home means, the enrollment of students in the engineering courses of our national universities, and a sub-committee was formed for the purpose of devising some means toward this end. The sub-committee took immediate action and as a result of a conference with the Provincial Department of Education, a report was submitted in which among other things it was set forth that the establishment of cash scholarships stood first as the most effective means of stimulating the enrollment of engineering students. To this end it was recommended that four scholarships of $100.00 per year each, and four scholarships of $50.00 per year each, be established in the engineering faculties of our national universities. This report was adopted by the Joint Committee and elaborated in the form of a circular which was sent out in July, 1918, to all of the high school and collegiate principals in the Province of Ontario.

This circular elicited favorable comment and one concrete result of the action of the Joint Committee was the adoption of the scheme by the Engineering Alumni Association of the University of Toronto. The Alumni Association took the matter up at once with the University of Toronto authorities with the result that the eight scholarships mentioned were actually established, a competitive examination was held on January of the current yeear and the scholarships awarded to the eight successful candidates. The funds for these scholarships were raised by the Alumni Association through an appeal to the industrial interests of the Province. It is understood that this general appeal met with so generous a response that the war scholarships scheme of the Toronto University Engineering Alumni Association is now a firmly established institution.

A further indirect result of the activity of the Joint Committee along the above lines has been the influencing of some of the larger industrial organizations to establish private scholarships schemes. Such projects are now being seriously considered by the Canadian Pacific Railway, the International Nickel Company, the International Harvester Co., and other similar organizations.

On April 1st, 1918, the officers in charge of the Canadian Engineers had appealed to the Joint Committee to assist them in obtaining candidates for commissions in that branch of the service. Work was immediately commenced by the Joint Committee and information was received from Ottawa, April 22nd, advising that more than enough applications had been received.

Confidential reports have been made on applicants for commissions in the Canadian Engineers to those administering this branch of the service.

Round Table Conference

During the summer of 1918, the Joint Committee began investigating labor conditions and together with the Canadian Manufacturers' Association which was carrying out a similar action, formed a Labor Committee. This committee had an interview with the Labor Committee of the Cabinet at Ottawa and out of this conference developed the Round Table Conference on November 29th at Ottawa, between representatives of the Trades and Labor Congress, the Joint Committee of Technical Organizations and the Canadian Manufacturers Association. It was felt by all concerned that the engineers had formed the cementing link between the Trades and Labor Congress and the C.M.A. Some of the points put forward for consideration in a reconstruction platform by the sub-committee of the J.C.T.O. were as follows:

Ministry of Reconstruction
Industrial Engineering and Research
Technical Education
Public Works
Water Power
Railroads
Canals
Raw Materials
Mineral Resources
Fuel Administration
Public Welfare
Tariff

At the conclusion, several representatives commented on the pleasurable surprise that the meeting had afforded. It was felt that the occasion was of historic moment, being the first time in Canada that Labor and Capital had met for the avowed purpose of mutual benefit. That so much common ground had been reached was thought to be extremely gratifying.

The recommendations drawn up at the conference were presented to the Cabineet about one week afterwards. A considerable reflex may be seen in some of the legislation now under consideration. The outcome of this event should be taken as pointing to a very definite field of useful activity for such an organization as the J.C.T.O.

Leading out of the interest of the Joint Committee in labor matters, the secretary of the Joint Committee was appointed a member of the Labor Committee of the Cabinet and by that Committee was appointed Deputy Vice-chairman.

Professional and Business Occupation Section, Department of Soldiers' Civil Re-establishment

In December, the suggestion was put forward by the Joint Committee to Mr. H. J. Daly, Director of Repatriation that the Labor Bureaus in various centres in Canada, would not assist materially in the placing of returned professional engineers and the higher types of business executives. It was suggested that special offices be opened in the larger centres to take care of these types of men. After further presentation of the facts to the Committee on Repatriation and to the Department of Labor and the Department of Soldiers' Civil Re-Establishment, it was decided that such offices should be opened in various parts of the Dominion.

An office of this kind has been opened in Toronto and already the results are beginning to justify the efforts put forth.

At the meeting of the executives of the organizations represented on the Joint Committee, such matters as publicity by engineers, scholarships, training of research men, assistance in connecting the link between employer and employed, etc., were discussed.

A motion was unanimously carried that it was the feeling of the meeting that the Joint Committee of Technical Organizations should be carried on and that a budget be prepared outlining the financial requirements of the Joint Committee, together with an idea of the work that is to be carried on and that amounts should be allocated to the various organizations represented on the Joint Committee, having in mind the strength of these various organizations.

Financial Report

The financial report shows a balance on hand of $356.25. It will be appreciated by all persons interested in this work that each individual must make some effort to see that financial support is given to the movement if the good work is to continue.

Industria Relations—Labor's Standpoint

The chairman then introduced Mr. Tom Moore, chairman Dominion Trades & Labor Bureau, to speak on "Industrial Relations—Labor's Standpoint."

Efficiency, Mr. Moore said, from Labor's viewpoint, was not judged by the standard of dollars and cents or the unit of output, but in its effect on human happiness and contentment. He condemned the so-called "efficiency" systems which had sought to standardize human beings and to make them, as far as possible, mechanically perfect. Such systems had brought labor to believe that capital had no interest in a man beyond the number of movements that could be got out of him in a day's work. The monotony of continuously repeating one small operation, also, was deadening to the human mind, and while by means of this specialization higher efficiency had been at first obtained, the ultimate result was a lower standard of efficiency, due to the harmful effect upon the workman. Real efficiency could only be brought about by the contentment of the workers, and to produce this contentment the conditions surrounding them, both in the factory and in their homes, would have to be congenial. Better housing was urgently needed and safer and more sanitary conditions generally in industry. Neither would the workers be satisfied until they were given their share in the management of industry, and it was the duty of the manufacturers to educate them so that they would be capable to take part in this control. An obstinate, stand-pat attitude on the part of the employers would result in labor seizing what they believed to be their right by force. Such action would be disastrous at present, as in the case of Russia. The country, therefore, must make provision for the situation and gradually educate the workers along these lines.

The Employers' Standpoint

Mr. J. F. M. Stewart spoke for the employer. Mr. Stewart said that the reasonable, fair-minded labor man and the reasonable, fair-minded employer are to-day looking at the problems before them through nearly the same size spectacles, but unfortunately there were extremists, and the extremist on the labor side was probably the more dangerous. When the armistice was signed labour was nervous and fearful of unemployment, as also were the employers, but it was to the credit of labor, during the months of readjustment, that it has, on the whole, played fair and, generally speaking, co-operated in this enormous task. The manufacturers, too, never tackled a problem with more serious misgivings and more anxiety, nor with more determination than they have tackled this problem of peace readjustment.

With regard to the future, Mr. Stewart was very optimistic. He said: "Having regard for present day conditions in this country, which are not bolstered up in any way, I would predict that when Canada's real effort gets under way by, say, the middle of this summer, that there will be a real shortage of labor."

The immediate and pressing need, the speaker pointed out, was for capital and labor to keep firm and steady. He did not suggest for a moment, however, that the problems of labor should be relegated to the background. One measure, he warned against was the undue shortening of the working day. Hours of labor had been gradually reduced, and employers recognized that this should be so, but to make the working day in Canada six hours, as has been proposed, is not possible. He believed, however, that the workers should be taken much more into the confidence of the management of industrial plants. The workman was entitled to recognition of his rights as a person. Also, there was social legislation of which he was in favor—such as mothers' pensions and old-age pensions. Finally, he pointed out the big opportunities before capital and labor in this country, and he believed that, working together, they could make it the happiest home on earth.

Sufficient Power for Twenty Cities—Southern British Columbia is Rich in Important Water Powers

In British Columbia, there are many important water-powers. The investigation of the water-powers of British Columbia by the Commission of Conservation has disclosed the existence of two great water-power centres, namely, Nelson, with 400,000 h.p. within a radius of fifty miles, and Vancouver, with 300,000 h.p. within the same distance. Based on experience at Toronto, these quantities would suffice for a population of 1,700,000 at Nelson, or for 10 manufacturing cities of 170,000 each. The power near Vancouver would suffice for one manufacturing city of 1,250,000 population, or for 10 cities of 125,000 each.

There are 12 power-sites in British Columbia of 50,000 h.p. and upwards. With the exception of the South fork Quesnel and Peace river, all these powers are less than 125 miles from the 49th parallel.

Kootenay river, Upper and Lower Bonnington falls, possible development	125,000	h.p.
Pend d'Oreille river, Waneta	73,000	"
Pend d'Oreille river, Salmon river	50.00	"
*Thompson river	100,000	"
*Fraser river, Hellgate	200,000	"
Bridge river tunnel	70,000	"
Stave river, lower site	52,000	"
Stave river, upper site	52,000	"
Coquitlam-Bunzten, north arm Burrard Inlet	84,000	"
Campbell river, possible	100,000	"
South fork Quesnel river	90,000	"
Peace River canyon	100,000	"

There are 18 power sites of between 20,000 and 50,000 h.p. Eight of these sites are distant less than 100 miles from the 49th parallel.

Kootenay river, Cora Lynn to Granite rapids	22,000	h.p.
Kootenay river, rapids near mouth	20,000	"
Pend d'Oreille river, Nine-mile falls	32,000	"
Pend d'Oreille river, Fifteen-mile creek	34,000	"
Columbia river, Long rapids	30,000	"
Adams river	30,000	"
Barriere river, ultimate development	20,000	"
Murtle river, Helmcken falls	20,000	"
Nahatlatch river, rapids below lakes	30,000	"
Jones lake (Fraser river)	25,000	"
Jordan river (25,000 h.p. developed), ultimate	38,000	"
Cheakamus river, Bear Mount canyon	40,000	"
Powell river (24,000 h.p. developed) ultimate 32,000	35,000	"
Nechako river, Grand canyon	30,000	"
Nechako river, Tetachuck falls and rapids	30,000	"
Bulkley river, Hagwilget canyon	20,000	"
Nass river, falls below Cranberry river	20,000	"
Nass river, rapids and falls below White river	20,000	"

*Development barred owing to presence of railways.

There are 29 power sites of between 10,000 and 20,000 h.p. capacity and 585 of less than 10,000 h.p. The report of the Commission of Conservation on the Water Powers of British Columbia includes all available data respecting 644 water-power sites.

Assisting Returned Technical Men

An appeal for co-operation in assisting returned technical men was made by Mr. Fraser Keith, secretary of the Engineering Institute of Canada, at the Montreal Electrical Luncheon on March 19th. During the next ten years, said Mr. Keith, Canada would witness the greatest industrial expansion in the history of the world. This would involve the development of our natural resources, and the connecting link between these resources and their conversion into national wealth was the technical man. Every advancement has been made by the solution of some technical problem. Besides our wonderful natural resources, one of the greatest assets that Canada possessed was the technical man, a fact which was not generally recognized. Technical men would be needed as never before. There was, however, a very serious danger confronting this country. The war had drained the universities and technical schools of some of the very best men, and the danger was in connection with the return of these men. If they were not assisted in the matter of finding suitable positions the technical knowledge gained before the war would be lost. The co-operation of the Federal Government and the various technical associations had been asked with a view to solving the problem. It was absolutely necessary that some scheme should be devised whereby the technical men should be established in civil life. Between 3,000 and 4,000 technical men had gone overseas, and the country owed these men everything that was possible in the way of assisting them to secure suitable positions. He asked the co-operation of those present to this end. It was agreed that the Committee of the Luncheon should assist in the way suggested by Mr. Keith.

Tenth Annual Report of H. E. P. C. O.

The third volume of the tenth annual report of the Hydro-electric Power Commission of Ontario, for the year ended October 31, 1917, has just been issued. This comprises 196 pages of hydrometric data gathered during the year October 1, 1916, to September 30, 1917, on the waters of the province of Ontario. At fifty-seven stations the stream flow has been under regular observation and the results for the year are given in this report. With the object of bringing the publication of stream flow data under the same water year as that adopted by Federal and other sources, the year October 1 to September 30, will be used by the Commission in future publications.

Under a Bill introduced into the Quebec Legislature, amendment is made to the law whereby power companies expropriate land on which to erect transmission lines. At present they are obliged to buy more land than is needed, and the change is to allow them to take only what is actually required.

Ontario Hydro Commission Building a Half Dozen Locomotives to Supplement 12 Already Operating on Chippewa Work

The Hydro-electric Power Commission of Ontario are building for use on the Niagara Power development six electric locomotives of which the following is a general description. These six locomotives will supplement 12 other smaller locomotives at present in operation at the Falls development and numbered E, to E12:

General Dimensions

Length overall	41 ft.	0 in.
Length of truck centres	25 "	0 "
Length of main cab	16 "	0 "
Length of auxiliary cab	9 "	6 "
Width over main cab	9 "	0 "
Width over side sills of locomotive	9 "	0 "
Width over auxiliary cab	6 "	6 "
Height of rail to bottom of side sills	3 "	4 "
Height of rail to centre of coupler knuckle	2 "	10½"
Height of rail to top of roof	12 "	8½"
Truck wheel base	7 "	0 "
Track gauge	4 "	8½ "

The locomotive is designed for double end operation for either switching or road service. Both ends are symmetrical about the centre line across the body, the total weight, including equipment, being 100,000 lbs.

Trucks are of the arch bar type with M.C.B. class C springs. Wheels are 36-in. chilled grey iron M.C.B. 1912 profile; avles M.C.B. 5½-in. x 10-in.; journals with centre between hubs of wheels of 50-in. to take motor bearings and cast steel gears which are pressed on the axle.

Under frame has six 12-in. I beams at 40 lbs. sills the full length of the locomotive with 8-in. I beams at 25 lbs.; cross sills rivetted to longitudinal sills; end buffers 15-in. channel at 33 lbs. rivetted to sides of longitudinal sills; bolster 1-in. x 14-in. x 9-ft. 0-in. longitudinal sills.

Main cab box type with two side doors; two end doors, four side windows, four end windows and removable doors between the main cab and hoods.

Two hoods are located at each end of main cab with two removable doors on one side of each hood. Carlines and posts in hoods and main cabs are standard structural shapes with inside finish in main cab only.

Additional ballast is added in flooring by placing solid cast iron slabs 2¾-in. thick by 18-in. by 9-ft. 0-in. long in the floor under the hoods at each end only. This ballast weighs altogether 24,080 lbs., and brings the weight of body truck equipment, etc., up to the required 100,000 lbs. total necessary for proper tractive effort.

The electrical equipment consists of four G.E. 66 B motors 125 h.p. each, two mounted on each truck; type M. multiple unit control consisting of 2 sets of D.B. 31 contactors, each set consisting of 13 contactors; 2 D.B. 20 reversers; 10 frames of rheostats; 2 C. 6 controllers; 2 B.T. 335 junction boxes; necessary kicking coils, lightning arrester, main switch, motor cut-out switches, fuse boxes, choke coil control switch, lighting headlight and heater switches, trolleys, etc.

Each pair of two motors is wired up in such a way as to give two sets of equipment separate and distinct from each other which are paralleled together in each controller, one of which is at each operating end. Located in front of each operating position where they can be readily seen and used in operation and under the hood is one set of contactors, one reverser, air gauges, whistle valve, sander valve, dump line valves, ammeter and all control switches.

All control leads are special standard 19-25 wires and run in conduit without colors, each individual wire being tested out before connection.

All main leads are special standard extra flexible wire and are run singly, each one in a separate conduit with the bellmouths and gaskets in each end for weather proofing and to prevent wearing of insulation on wires in operation.

Air brake equipment is Westinghouse No. 14 E.L. locomotive air brake as used by present steam roads with two 50 cubic feet motor driven air compressors, both located in main cab. Extra features are the dump line operating couplers, and values used for operating 20 cu. yd. dump cars on the Niagara Power Development.

All compressors and control are equipped with multiple unit features so that it is possible for one operator to operate two or more locomotives from the one controller.

Four trolley bases are used due to the double end operation and side trolley wire construction used. The trolley wire on which these locomotives will operate is located 7 feet from the centre line of the track and 24 feet from the rail requiring the use of four trolley bases with poles bent out to reach this wire.

Interior finish of cab is painted dark green; floors, doors and sash, medium gray; outside body and truck, black; lettering and stripping in yellow; numbers E 13 to E 18 inclusive lettered Hydro-electric Power Commission.

Fundamentals of Readjustment

At the recent mid-winter meeting of the American Electric Railway Association, held in New York, one of the most important reports presented was that by the Committee on Readjustment. Mr. P. H. Gadsden, chairman of the committee, pointed out that there were certain fundamentals which must control the adjustment of the relations between the companies and the communities they serve, which his committee outlined as follows:

1. The elecric railways of the country are breaking down under present conditions of operation. As a result, the public is being deprived of service and is facing certain financial losses through the depreciation of electric railway securities which are held by savings banks, life insurance and trust companies and other similar institutions in which its savings are invested.

2. This condition is primarily due to the economic error of establishing an inflexible fare regardless of the cost of the service rendered or the distance hauled.

3. To correct this difficulty, flexible fares must be established which will be automatically adjusted to the cost of the service demanded by and furnished to the community.

4. A necessary element of the cost of service is such a return on the fund employed as will attract capital to the public service. To provide incentive to enterprise and initiative, there must be an additional reward for economical management.

5. In the interest of the car rider, who must ultimately pay the cost of local transportation, every special impost and tax which cannot be justified upon the ground that it is payment for benefits received should be abolished.

6. To secure satisfactory service and keep fares as low as possible, the public must act on the principle of the "greatest good to the greatest number" and must co-operate with the operating companies in making effective economies by the use of "skip-stops," one-man cars, etc.; and the speeding up of schedules by reduction of vehicular interference.

7 Electric railway transportation is a community problem to be solved by the community and the company acting together and animated by a spirit of civic interest and devotion to the public service and having as its object the establishment of such regulations as will give the public the great-

est efficiency, economy and enterprise in the operation of their transportation utilities.

8. The committee proposes to carry out as rapidly and as effectively as possible the following program:

a. To furnish to members of the association at as early a date as possible, information concerning franchise settlements and agreements along service at cost and other lines.

b. To analyze these various agreements and present for the information of the companies such a summary of their provisions as will provide a guide in the drafting of new ordinances or agreements.

c. To directly assist communities in which the readjustment of franchise relations are under way.

d. To furnish at the instance of the railway company to civic organizations and similar bodies, information as to, and studies of, public utility questions.

Mr. Gadsden suggested two alternative solutions of the predicament in which the railways found themselves: (1) The general acceptance of some sort of service-at-cost plan, and (2) the adoption of some kind of municipal or governmental ownership.

N.S. Tramways Increase Earnings

The Nova Scotia Tramways and Power Company report sent out to shareholders today shows that despite labor difficulties, influenza epidemic, which reduced traffic, and daylight saving, which cut demand for lighting currents, the gross earnings show a slight increase over the previous year. Permission being granted by the Board of Public Utilities to increase the price of gas, the directors believe this department will be able to operate with a margin of profit, which was not the condition prior to the granting of the increase.

Mention is made of the Board of Public Utilities having ordered additions to rolling stock, and extensions and improvements in the present track layout. The report says the prospects for increased business in the various departments of the company's activities are bright.

A Zone System of Fares

The president of the Public Service Railway of New Jersey recently presented a plan before a hearing of the Public Utility Commission of that city, for a zone system of fares on the lines of his company. The rates recommended are as follows: A stand-by or ready-to-serve charge of 4c and a distance rate of 1c a mile, making the fare for the first mile 5c, second mile 6c, third mile 7c, and so on. A charge is also made for transfers; a ready-to-serve charge of 1c with a distance rate of 1c a mile, so that a one-mile transfer costs 2c, a 2-mile transfer, 3c, and so on. The fare would be collected on the pay-as-you-leave system, passengers receiving an identification zone slip as they leave. The company claimed that it was entirely practicable to collect fares on this basis.

Toronto Section A. I. E. E.

The Toronto Section of the American Institute of Electrical Engineers held their usual semi-monthly meeeting in the Engineers' Club on March 21st. The address was by Mr. J. Lester Woodbridge, on "Storage Batteries." There was a large attendance and a spirited discussion following the address. The April 4th meeting will be addressed by Mr. George D. Leacock. The April 11th meeting will be held in Hamilton. The annual meeting is on April 25th.

The Gatineau Development Co., Ltd., of Maniwaki, P.Q., has been incorporated with a capital of $99,000 to carry on the business of an electric light company in the township of Egan, and to deal in electric fixtures and supplies.

Cost of Reading Meters and Billing Customers Reduced

A considerable item in the expense account of the central station is the cost of reading meters and billing customers. The manager of a large plant who has been successful in effecting big economies, writes in "System" as follows:

Meter Reading and Billing Economies

If we keep on cutting corners we figure that pretty soon we'll get our collection expense down to 0. In postage alone we've cut our expense from $50 to $2.67.

We have done this by changing our method of getting our bills to our customers not once, but three times. In other words, we did'nt stop with one improvement, even if that improvement did save us $15. We made another and still another and we're not satisfied yet. I'm sure we can find at least one more cut to make.

We have 2,274 customers located in several towns. At one time we mailed out all of our bills. Of course we sent each customer's bill under personal cover.

That was when it cost us $50 to get our bills to our customers. Our first saving—of $15—came when we sent several bills under one cover. We had to revise our mailing lists to do it. If we had a customer who operated a store, we mailed his residence bill land his business bill in one envelop to his business address; if his salesmen were also customers we included their bills in the same envelop.

We were able to make many combinations like this and we had but few objections. Where we did we mailed the bills separately.

We were satisfied to pay $35 to mail our bills for just a little while, however. Another change made it possible to cut down this cost still further.

In some of the towns in which we operate we have men working on regular monthly salaries. These men have miscellaneous duties; whether they are busy or not, their salaries go on just the same. If, then, we figure, we could get an additional necessary operation from this fixed expense, we would be saving the cost of that additional operation. So we arranged to have these men deliver the bills.

Just as soon as the bills are made out we send them to the local offices. Here they are sorted by street and number and dated; and then delivered.

That brought down the cost of getting our bills to our customers to $8.83.

The last change we made was to cut out the bills altogether in those towns where it was practical to do so. Of course that meant a saving of much more than postage. We figure, roughly, that we have been able to save $10.95 in office and collection follow-up work.

Formerly we read meters each month between the fourteenth and twenty-third. The statements would be made out in the central office and mailed to reach our customers on the first of the following month.

Bills were payable on the tenth. Few of our customers paid promptly, however, especially since we had to remove our prompt-payment discount on account of increased costs. That meant we had to wait until the twenty-fifth for our money, and to send a collector for it then.

So we decided to reach the meter, figure the charge, and collect the money all at one time. We furnished each reader with the necessary account and receipt slips.

We save at least an extra call, and we save a lot of clerical work in the office. We're able to straighten out a dispute right on the spot.

The $2.67 postage we still pay is for bills to customers in those towns where we have not been able to make this last change. But we are hoping soon to bring those towns into line.

The Contractor-Dealer

"Greater Turnover" is the Problem of the Electrical Industry—Proper Machinery Must Be Supplied

Since Mr. Goodwin made his cursory visit to some of the electrical stores in Toronto, there is evidence that his few words of advice have taken effect, but no one could say that there is not still much room for improvement. The crying need not only in Toronto, but throughout the length and breadth of the Dominion is more electric stores and better stores. How can the industry prosper otherwise? The demand for electrical appliances is constantly increasing. The quantity and number is also increasing at a tremendous rate. Is it not true that the profits from the merchandising of electrical devices are attractive? Why then is there such a dearth of good electric stores?

The manufacturer says the answer lies in the fact that the merchandising of appliances has been left to a class of men who do not yet quite grasp the situation. They are not merchants by training—perhaps not even by instinct. They were contractors first and this, in many cases, still occupies the chief place in their attention. Yet no one can fail to see that the electrician, with his special knowledge of the trade, is the proper man to handle electrical goods.

The dealer, on the other hand, claims that the profits allowed by the manufacturer and jobber are not sufficient. He points, for example, to the shoe trade, where profits anywhere from 50 to 100 per cent. are readily obtained—and this, too, on constantly recurring sales. No one attempts to fix the retail price of shoes. No one insists on giving a one, two, three or five year guarantee. Why should the electrical appliance business be surrounded by so much red tape?

Between these two views it is surely possible to reach a solution. The big thing we are all after is—**increase in volume of turnover.** This means many electrice stores, well-equipped with salesmen who understand electric goods, and also know the retail business, and this condition again is only possible if the inducements are sufficiently remunerative.

In a nutshell—we must make the electric retail business so attractive that plenty of good men will get into it.

A Mistake Today Will Retard the Industry Many Years

"Hardware dealers are a big factor to-day in the electrical field. In many places they are the dominant factor. Many of the largest firms would far rather have their various specialties handled through the hardware stores than through the electrical dealers. This may seem strange, but the explanation is simple. They have found by actual experience that the hardware dealer is a keen, aggressive business man, and that he will push sales in every possible way. Many of the electrical dealers on the other hand are content to take what business comes to them. Where the hardware man advertises aggressively and puts on nice window displays, and places the electrical lines he is handling at various points in his store where everyone who comes in will see them, the electrical dealer very often is content with putting a couple of irons in the window and maybe not changing the window for a month. It is the easiest thing in the world for the hardware dealer to take away business from the electrical man under circumstances of this kind, and he has done it."

This is from a hardware journal that is making a big bid for the support of the electrical manufacturers and jobbers. It is true only insofar as it indicates that electrical contractor-dealers are not sufficiently aggressive. It is not true that hardware stores in general push the sale of electrical appliances. They simply stock a few of the most attractive looking of them. As pointed out in these pages frequently, the hardware merchant is not in sympathy with the electrical industry. He knows and cares nothing about it beyond the mere profit it brings him as a side issue. Neither does he make friends of the industry among his chance customers, because he is in no way equipped to give these customers electrical **service** in the form of information, advice, repairs, etc. And the placing of electrical devices, as we electrical men all have found out by bitter experience, is almost purely a matter of "service." In other words, selling electrical appliances is largely the sale of an "idea." Consequently the appliance does not "stay" sold unless the **idea** is maintained by a constant and efficient service.

Does it not follow then that the ultimate result of the placing of electrical appliances in the hands of hardware merchants would be entirely detrimental to the electrical trade? We think so and we strongly urge that manufacturers and jobbers who may have thought of following this path of least resistance should reconsider whether, in the end, their business would not be much more voluminous and profitable if handled by the contractor-dealer who **knows** these goods.

It may be true, and we will admit for the sake or argument that it is, that hardware men are more experienced merchandisers than are the contractor-dealers. This, however, is a defect that can be remedied. There is no reason why electrical contractor-dealers should not be schooled in proper methods of retailing. On the other hand it will never be possible to excite the interest or gain the sympathy of the hardware dealer because his interests and sympathies are already spread over an almost infinite field. The only thing that attracts his sympathy is "profit," and if nails or bolts yield him more profit than electric toasters and give him less trouble, then his sympathies will lie with the nails and bolts.

The item quoted alone, however, indicates that a definite propaganda is under way to disorganize the electrical industry. It is a serious situation enough. It is not alone the electrical dealer that is affected, but the whole trade. The dealer problem, however, is the crux of the whole situation because he is the funnel through which, ultimately, the products of the whole industry must pass to the consumer. If our contractor-dealers are properly organized and properly equipped for merchandising there is scarcely any limit to the possibilities of expansion in the electrical trade. If, on the other hand, the merchandising of these goods should get into the hands of any unsympathetic group of retailers, the whole industry may easily become dwarfed and stagnant.

It is a question that must be met and solved, and solution can only come, we believe, by the close working together of manufacturer, jobber and contractor-dealer so that a comprehensive and sufficient scheme may be worked out and carried out.

Toronto Electrical Contractors Launch the Open Price Plan

The Toronto Electrical Contractors' Association, as intimated in our recent issues, have taken the plunge and launched the "Open Price Plan" of submitting tenders.

The whole plan is very clearly outlined in an information sheet just distributed by the Open Price Committee. It will be noted that the information is being exchanged through a central office or "Clearing House," just as banks daily distribute and exchange their bills, cheques, drafts, and so on. The "Information Sheet" is reproduced below and is fully explanatory:

INFORMATION OPEN PRICE PLAN
EFFECTIVE MARCH 24, 1919.
of
Toronto District—The Ontario Association of Electrical Contractors and Dealers

Toronto, Monday, March 10, 1919.

1. The Open Price Plan is open to every member of the Association. Each member will be supplied with the following forms:—

(a) Information Sheet.

(b) Forms for copy of tenders and summary of estimate.

(c) Printed Envelopes to "Clearing House."

2. Each member shall report to "Clearing House" as follows, at the same time and by the same means by which original tender is sent. (That is, by mail, phone, etc.)

(a) **Two Copies** of Original Tender, with summary of estimate.

(b) Enclosed in printed envelope to "Clearing House."

It is important to fill in all information on Summary of estimate.

3. Upon receipt of this information, "Clearing House" will exchange this information with all others—**who have reported tenders**—on the same job.

4. Successful contractor shall report by letter **in duplicate** to "Clearing House" immediately upon closing job, that same has been closed and the price.

5. Notice of award will then be mailed by "Clearing House" to all members who have tenedered on job.

6. Meetings will be held, in addition to the regular business meetings of the Association, for the express purpose of discussing all the information obtained and the subjects of estimating and cost accounting. (Minutes of these meetings may possibly be exchanged for those of similar meetings in New York and Chicago).

The adoption of the Open Price Plan is the result of Mr. Goodwin's suggestion at our meeting of January 31st, 1919. The preliminary form of the Open Price Plan, as unanimously adopted at the meeting of March 6, 1919, was reported to that meeting by the Open Price Committee, composed of the following members:

Mr. Harris—Harris and Marson.
Mr. Salisbury—The Salisbury Electric Co., Ltd.
Mr. Hicks—Harry Hicks Co.
Mr. Wood—Wood Electric Co.
Mr. Cruise—Toronto Electric Co.
Mr. Kay—Bennett and Wright Co., Ltd.
Mr. Gray—R. A. L. Gray and Co.
Mr. E. C. Clarke—The Clarke Electric Co.
Mr. Myers—J. Everard Myers.
Mr. Drury—E. A. Drury.
Mr. Rooks—Rooks Electric Co.
Mr. McIntyre—Beattie-McIntyre, Ltd.
Mr. Rohleder—Harry Alexander, Incorporated.
Mr. Ramsden—Ramsden and Roxborough.
Mr. H. H. Windeler—Windeler Brothers.
Mr. B. L. Clark—Canada Electric Co.
Dr. Walter R. Carr, Ex-officio.
Mr. F. W. Wegenast (Counsel) Ex-officio.

Out of the above eighteen, sixteen were present at the meeting, indicating the intense interest in the Open Price Plan.

A later meeting of the Open Price Committee was held March 20, 1919, at which it decided to recommend the immediate adoption of the complete Open Price plan, as outlined above.

The object of the Open-Price Plan is to educate our members in proper, standard methods of estimating and cost-accounting, including the vital subject of **"Overhead Expense."** Discussion of a general nature can go only so far. The practical results will be obtained by thus exchanging information with each other. Discussion will then become specific.

The object of the Plan is **not to fix prices,** but to stabilize prices by publicity, much in the same fashion as transactions in stocks and bonds are listed on the Stock Exchange. Prices are made known only after they have been quoted. Also monthly reports will be sent in as to monthly cash receipts, pay roll, etc.

The effect of the Open Price Plan will be to—

1. Give our members confidence in one another, tending to replace distrust and suspicion.
2. Stabilize prices.
3. Make our business more efficient.
4. Competition will be based more on efficiency and less on ignorance.
5. Increase business with less cost for estimating.

The success of the Open Price Plan depends upon yourself.

OPEN PRICE COMMITTEE, TORONTO DISTRICT.

N.B.—Phone "Clearing House" for additional report forms and envelopes, as required.

Hear Mr. Wetherbie's Talk on Merchandising

The regular monthly meeting of the Toronto Electrical Contractor-Dealers' Association will be held in the King Edward Hotel on April 3rd. It happens that the salesmen of the Canadian General Electric Company are in conference during the same week and one of the items on their program is a sales talk by Mr. Wetherbie, sales manager Fan and Motor Department of the General Electric Company. It has been arranged that Mr. Wetherbie's address should be withheld until the evening of April 3rd and delivered before a joint meeting of the Canadian General Electric salesmen and the electrical contractor-dealers. This is a splendid opportunity for electrical contractors to gain some valuable information on modern methods of merchandising and it is hoped there will be the fullest possible attendance. Remember the date—King Edward Hotel; 8 o'clock; April 3rd; Sales Talk by Mr. Wetherbie.

In a bill now before the Massachusetts Legislature it is provided that the Lynn street railway be operated by funds from general taxation and that no fares shall be collected on the cars.

How to Put on An Electric Cleaner Campaign

This is the brief outline given in the March Monthly Sales Service of the Society for Electrical Development of a month's campaign that sold 112 electric cleaners of a well-known make in an Eastern city. The profit on the campaign was stated by the company to be "over $900 on the cleaners alone." In addition there was an increase in merchandising receipts of 1023.7 per cent. over the same month a year before.

This is how they did it. It is interesting to note that the sales manager of this lighting company was skeptical of cleaner sales; he knew little of the article but finally listened to the suggestions of the manufacturer's representative to buy 12 machines and display them is his show-room. If they sold he would re-order and possibly try out a campaign.

The 12 machines arrived, and were displaced on display, alongside two other makes of cleaners. After two weeks the machines were still on the floors unsold. This proves the contention that electrical specialties will not sell themselves; people don't stroll in and buy cleaners, washers, and the like—they have to be sold. This is principle number one in conducting such a campaign.

Not discouraged, the manufacturer's man finally persuaded the manager to let him put two men in the city, to prove that the cleaner could be sold and would stay sold. He agreed to prove that he could move between 75 and 100 cleaners in four weeks intensive campaign. Since the manager had on a previous campaign sold only 10 cleaners he had his doubts, but he was game, and went ahead.

The company had 6,000 residence customers connected to the lines. These customers were listed on an individual and plain 4 x 7 "prospect card." They were all sorted into 28 different districts or routes in order to save time in solicitation. The prospect's telephone number was placed on the upper right hand corner of each prospect's card.

Two men were sent from the jobber's office to work with the company. They were experienced cleaner men; they helped educate the central station's own representatives. At the outset it was made plain that the cleaner must not be "over-sold," no mis-leading statements were to be made and courtesy to the prospect and customer was to be the keynote. A girl was employed who was to call up the customers of the company by phone and arrange for demonstrations to be made in the prospect's homes. The advertising consisted of an 80 inch advertisement in the paper each week of the campaign, but on different days in each of the four local papers. Advertising pamphlets and folders were enclosed in the monthly lighting bills rendered to the company's customers. In every way possible the cleaner was brought to the attention of people who had electricity in their home.

Opening the Campaign

At 9.30 one morning the campaign opened in earnest. The following was the method used in approaching prospects over the wire:

"Good morning Mrs. Jones. This is Miss Smith of the Blank Electric Light Company. To-day our Mr.— is demonstrating to the Model Housekeepers of our city, the wonderful A— Electric Cleaner, which no doubt, you have seen on display in our office. This afternoon our M.— will be in your neighborhood and we would very much appreciate it if you would allow him to call at your home and show you the merits of this electric cleaner. This demonstration will not cost you a cent, we simply ask you to give Mr. — your opinion as to the value of such a cleaner in your home."

This was the gist of the telephone conversation used by the operator. It resulted in a great many more home demonstrations than the company could take care of.

The machines were advertised to be sold, not on the partial payment plan, but on what we termed the "A—(name of cleaner)—Club Plan." Approximately 84 per cent of the machines sold were put on the "club plan," and 16 per cent were cash sales. $2.50 was deducted from the list price for all cash sales. Also, of the 112 machines sold, 108 were sold complete, with all tools.

The girl operator was used for two weeks, then a man was tried. The girl secured the most telephone demonstrations. The company's men covered only about 4 of the 28 districts, the remaining number being covered by the men loaned to the city. Of course these men could work faster, being better acquainted with their sales subject.

The big success was due partly to the fact that the trial time was cut down to one day; the two men delivered the cleaner, and either sold it then or brought it right in. Five dollars was collected by the men upon delivery and the balance was charged on the bills, so much monthly. As said above, $2.50 was added to the price for time payments. Cash sales averaged practically 20 per cent. The average time-payment price was $47.50.

One of the salesman had an auto which was of great help in getting around. All the men took the cleaners along with them. Some salesmen dislike to go about the streets or in cars carrying a cleaner, but the wise business-getter knows that this very fact often opens up avenues of sales for him. When he sees the people are interested he doesn't hestitate to broach his sales subject to them.

Summary of the Campaign

An axiom developed by this campaign was that "the more prospects the salesman can see the more he will sell." It is all a matter of averages. Given so many live prospects, the average salesman can see about "so-many" in a day, making such-and-such a form of solicitation. If his solicitation or demonstration can be shortened, or if he can be made to reach more prospects in the same given time, then he is assured of a bigger business, because it is certain that under average conditions he can sell about such-and-such an average.

In the above campaign, the "club plan" embraced a broad and comprehensive guarantee by the manufacturer (who furnished a certificate with each machine sold) and a guarantee of satisfaction by the lighting company. There were few store sales. There were no store demonstrations, but this could easily have been arranged had conditions been considered favorable for it.

This campaign, it should be mentioned, was held in the middle of summer—a time of the year when it was considered that cleaners could never be sold by campaign methods, in quantity. But this goes to prove that cleaner selling is not a seasonable proposition. Electric cleaners can be sold in the dead of winter and the heat of summer just as well as in the spring and fall.

The company is following up the beforementioned campaign and expects to sell another 300 cleaners on the strength of the 112 already put out. It states that only about one-fifth of the territory has been canvassed.

Brief Resume of Plan of Action

1. Make certain of your make of cleaners (will the selling price appeal to the greatest majority of incomes in your city, etc.)

2. Get the manufacturers' co-operation and don't overlook the jobber—whichever you buy through.

3. Analyze your local market as to the possible number of cleaners sold, compared with number of resident-custom-

ers of the lighting company not possessing cleaners; also analyze local competition; who now sells cleaners, and how. Have there been any active cleaner campaigns. Would door-to-door canvass and solicitation be practical.

Estimate carefully (with the help of jobber of manufacturer) the number of cleaners that might be sold in the campaign, decide carefully on selling price (whether to sell at less-than-list or not, etc.) apportion the selling and advertising expense so that you know just "how much" out of every cleaner sale can be charged to advertising, .o demonstration, etc.

5. Form the basic plan, whether to have a"club-plan" as above, or a "time-payment" plan, or "cash-discount" sale, etc. Whatever is decided, this should be the "feature," or drawing-card of the campaign.

6. Educate your entire organization on the campaign; let them know the plan, what their duties are, etc.—even if they are not to sell. The bookkeeper may be able to sell cleaners simply by being able to answer questions; the errand boy may lose you sales if he it not 'educated' as to just what the sale is, etc. should a customer come into the store, and nobody be present at the time to wait upon him.

7. Try to analyze in your city whether your appeal must be made mainly to men or women. An investigation of 793 dealers show that out of every hundred sales of cleaners 50 are bought hy women, 22 by men, and 28 by both men and women. This investigation covered all sorts of dealers, department stores, specialty merchants, house-furnishing stores, and so on. It is true in some cases that the men buy, after being urged, even "nagged" by the women for them; in a few cases men buy outright, but this is not true of the lower priced machines, which are usually bought by the woman. On this basis, advertising appeal should be made to the man-of-the-house as well as the housewife. This can be done by mail, or in person. The man should not be overlooked.

8. Chart your prospects by districts, precincts, sections, blocks, or in such fashion that your outside people can make shortest work of solicitation. Map out these districts, carefully beforehand, and have it distinctly understood just which man is to cover the different territory.

9. Arrange for telephone solicitation (the Society has just prepared a short report on How to Get Business by Telephone). Be careful of the girl who does this telephoning, and particularly about what she says, and how she says it. A mature woman makes a better representative of your company than a girl, both as to telephone solicitation and demonstrations.

10. Get your store interior and window fixed up; have sufficient models on display to take care of all requirements (a campaign is not a campaign if there are not quantities of cleaners in the store, windows, and the place does not have the hustling appearance usually connected with stores carrying on campaigns).

11. Begin your campaign at a certain time, carry it on for a certain period (and advertise the time). Don't drag out the campaign for too long a time. Try to cover your territory quickly and intensively.

12. Advertise consistently, and frequently. Don't quit.

13. Don't overlook the possible help of the central station, or even a bank—any way to finance payments that will make it easy to pay is advisable. The more co-operation you get from other electrical interests the better. Don't worry if other dealers display and feature cleaners during your campaign; you can't stop their selling some goods through your own advertising. But don't consider them in your advertising or personal solicitation; never mention a competitor—never knock—never criticize. Play your own game, and play it hard.

14. Follow up your campaign. Try to place every cleaner so that the customer will be glad to give you the names of friends to whom you can later sell cleaners. Beware of 'come-backs.' Follow up each installation within a prescribed time and see that the product is giving satisfaction.

Dalyte Electric, Limited

During the year 1911 Mr. J. S. Wheeler organized The Flexible Conduit Co., Limited, to manufacture flexible conduits which are used in electrical installations. This company was successful from the start, and the demand for its products increased so rapidly that they are now producing ten times the original output. Later, in 1914, he organized the Munder Tungsten Lamp Co., Limited, to manufacture tungsten lamps. The operations of this company have also been very successful and the production today is many times greater than at the start. Again in 1917 Mr. Wheeler organized the Dalyte Lamp Co., Limited, to manufacture nitrogen gas filled high efficiency lamps. These three companies were located in the same factory building, all under the management of Mr. Wheeler, with one office staff, and owned by one group of stockholders. Last December the stockholders of the three companies decided to amalgamate. The amalgamation is now completed. Dominion Charter has been granted under the name of Dalyte Electric Limited, with authorized capital of $1,000,000.00.

The new company own the factory buildings and real estate in connection therewith, and are now installing equipment to again double the production in all departments. Sales offices have also been opened in all the principal cities in Canada. The new company is under the same management as the old companies, and the officers and directors were elected from the three groups of officers and directors of the old companies. Owing to the greatly increased manufacturing facilities, the new company will now be in a position to render much better service to their customers, as we understand the old companies have never been able to cope with the business offered them.

Put Your Capital in Live Merchandise

Sell the goods that sell. Stock and advertise the goods that will whet the public appetite. Study the needs and buying habits of your trade, and select those goods that they will buy without so much urging.

Merchandise that sells quickly, with a rapid turnover, no matter how small the gross profit, is a quicker money-maker than goods that afford a wider margin of profit but are slow-selling. Wide-awake merchandisers are learning that rapid turn-over means a corresponding low cost of doing business. It is the slow moving items, that require to be shown time and time again, which are the ones that pile up the selling costs.

Sell the goods that sell more easily.—Sales Service.

Now that the war is over, the Administrative Commissioners of the city of Montreal will request the Quebec Public Utilities Commissioners to compel the public utility companies to place their wires in the underground conduits of No. 4 and No. 6 districts. These districts comprise St. Lawrence Street from Craig to Sherbrooke Streets and Craig and Notre Dame Streets, from St. Lambert Hill to McGill Street. The Utilities Commission decided, in April last, that the companies be allowed to defer the work owing to the abnormal cost of materials and the difficulty of securing supplies, due to the war. The Commissioners postponed the work until conditions altered. The city now contend that this time has arrived, and that the city is entitled to get the benefit of the conduits.

Good Factory Lighting vs. Increased Production

By Mr. H. Leveridge[*]

The Department of Labor welcomes and appreciates this opportunity of discussing with your Association the provisions of the recently adopted Code of Lighting for factories, mills and other work places, and in my prepared remarks I have endeavored to cover the subject as thoroughly as limited time will permit.

During the past two decades the relation between employers and employes has materially changed. Previous to this time no special attention was paid to working conditions or effort made to insure the comfort of the employee. Labor gradually organized and demanded certain working conditions. These were at first grudgingly granted. Gradually, however, with a most intensive study of plant management, superintendents and others began to see that the mere economics of plant operations demanded improved laboring conditions. Efficiency began to be the watchword. It was overdone in some instances, for practically nothing else was heard for a number of years.

It was pointed out and clearly demonstrated that improved laboring conditions meant greater outputs for the same cost. This meant a greater return on the investment and both capital and labor benefited.

One of the features of these revolutionary changes was the Safety First Movement. Accidents are expensive and demoralizing. Investigation proved, beyond question of doubt, that the majority of industrial accidents were avoidable. Through the universal spreading of the Safety First Movement accidents have been greatly reduced. Many factors are contributory causes to accidents. The more advanced employers realize the ill effects of accidents and take due precaution in designing the equipment of their shops to make them safe.

On the other hand, many employers are possibly ignorant, ill informed or naturally thoughtless. They take no precautions of this nature. At this point, for the protection of its citizens, it is necessary that the State step in and put into effect certain mandatory rulings.

The statute books reveal legislation of many forms along this line. It is only recently, however, that the relation of lighting to accidents has been understood and recognized. Analysis of accident reports reveal that bad lighting is a contributory cause. Statistics show that many accidents are due to falls and to being caught or cut by moving machinery. It can be seen that the old scheme of placing a single lamp without a reflector immediately over the work causes many of these accidents. Such a system of illumination may give plenty of light on the work, but it does not give sufficient for the aisles and passageways or on the moving parts of the machinery such as the gears, where the actual work is not being carried on. Under conditions such as these, articles are often allowed to accumulate in the aisles resulting in falls. It is doubtful whether the foreman would have allowed these things to lie about if the passageways had been well lighted.

Furthermore, with such a system of lighting where the eyes are not shielded from the lamp, the workman is not able to see well when he turns away. Not seeing the fast moving gears or belts, he may come in contact with them and injury results. A system of general illumination for the entire room will greatly aid in overcoming these faults. Naturally, those interested in lighting, such as the engineers and scientists comprising the membership of the Illuminating Engineering Society, were the first to recognize these relations. A committee on lighting legislation was formed which was composed of some of the foremost experts in industrial lighting of the country. They formulated a set of rules or specifications designed to aid State Legislators and departments of labor, who wished to prepare codes of lighting. This work was not done in a single sitting, but required months, even years of careful thought, discussion, accompanied by experimentation. Their next move was to get in touch with cretain representative law making bodies and to offer their cooperation along the lines laid down.

Minimum Requirements Often Not Satisfactory

The requirements set forth in the code are not in the least exacting. The only factor concerning which a state can legislate is that of safety. Economic operating conditions actually demand far higher intensities than specified as minimum by the code. You should take every opportunity to point out to the factory men that compliance with the rules does not mean that they will have what we all consider good lighting. Maximum production demands far higher intensities. It is good business on their part to increase the intensities several fold over those specified as minimium, if they wish to get the greatest output for the minimum expenditure for labor.

It is not in our province to go into that question here, but very careful investigations reveal that good lighting does materially increase production. For example, it might be well to state one specific case now on record. It is true that there are many factors which effect production, and it is almost impossible to differentiate between them.

A number of tests have been proposed to determine the relation of light to output. In one conducted by the Commonwealth Edison Company of Chicago, in a machine shop, incandescent lamps in deep bowl reflectors were carefully designed to provide four foot candles of illumination at the work. The men worked under these conditions for a period. Then the intensity was increased to 12 foot candles, in other words, the lighting was trebled. This change was attended by an 8 to 27 per cent increase in production. These figures cover eight different operations which averaged a 15 per cent. increase. Every precaution was taken to insure fair results. That is really startling. An average increase of 15 per cent. in output as a result of an extremely small actual increase in operating expense. The amazing thing is that the initial intensity, four foot candles, is ordinarily considered good lighting. For example, in our code under intensity required, Class F. the foot candles, ordinary practice is stated for fine manufacturing, such as fine lathe work, pattern and tool making, light colored tetxiles, as four to eight foot candles, whereas our minimum requirement is only three foot candles.

I merely bring in this illustration to show how lenient the code is in its absolute requirements and how it is to the operating concern's advantage to not only meet the requirements of the code, but go far beyond them if they wish to get the greatest return on their investment.

So much for the historical side of the question. I have briefly outlined the origin, development and reason of the code. Let us now analyze the features attendant on its successful operation. I bespeak the heartiest co-operation on your part.

The success of any progressive humanitarian movement is largely dependent on the state of education of the people it affects. It is obviously impossible to enforce something which the public does not understand, at least in a general manner. The code of lighting can be enforced with minimum friction only after a campaign of education and publicity. You are the people in direct contact with the installation. You can sell poor lighting or you can sell good lighting. Through you the manufacturer can become informed on the requirements of the code, on the method of meeting these requirements and on the general advantages accruing from adequate artificial illumination systems.

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The first step, therefore, is to become thoroughly familiar with the code yourselves; with its intent or purpose, with its requirements and with the means of meeting these requirements. Then you are in a position to preach the doctrine of better industrial lighting. Incidentally, this, of course, means money in your pocket.

It is safe to assume that the great majority of factories and workrooms do not satisfactorily comply with the essentials of good industrial lighting. There is a tremendous field for improvement. The large shops, in general, have trained engineers or men who have time to devote to the investigation of this subject. The manufacturer of lamps and reflectors can afford to spend some time in missionary work with a big plant, laying out the lighting system and otherwise selling good lighting. It is not economically feasible, however, for the manufacturer to go direct to the small shop. They attempt to do it through general publicity, it is true, but you gentlemen have the most at stake and should spend some time and effort in educational work with this group.

It is not necessary to be technical, in fact, the aim of everyone concerned when writing the code was to avoid technicalities and put the data in its simplest terms.

An Analysis of the Code

Let us now take up the code section by section and discuss the matter with the view to getting it thoroughly clear in our minds.

Rule 1 is merely a general statement to the effect that with diminishing day light or absence of daylight, artificial light must be supplied in all parts of a plant where work is carried on or where workmen are likely to be required to go in the course of their duties.

In rule 2 we have expressed the one definitely measurable feature of lighting, that is intensity. It is apparent to anyone who gives the matter a little thought that safety requires enough light to clearly see every dangerous object; that protection of the eye from undue strain requires that enough light fall on the work so that it can see the details of the work without severe strain or forcing of the ocular system. It is, therefore, perfectly logical to specify certain minimum intensities of illumination for different classes of service, not that the amount of light is the only governing feature which makes good lighting, but being something which we can determine, it is gone into in somewhat more detail than the other features. In many respects rule 3, covering glare, which we will take up later, is more important than intensity, but at the present state of the art, we have no instrument or means of measuring or specifying glare, and therefore have to content ourselves in this instance with a general statement.

There are a number of instruments, known as portable photometers, which enable us to measure the intensity or amount of light falling on an object. These instruments in general are simple in operation, quite accurate, although some types are more complex than others. The simplest type, although not the most accurate, is known as a foot candle meter. This instrument is small in size and self-contained, in fact it can be carried in the coat pocket and was developed especially for this class of measurement. On the inside of the instrument is a flash light battery, a resistance coil and a voltmeter. This equipment supplies current to a small standardized lamp and regulates it to the correct voltage. The voltmeter is calibrated with a marking at which the needle must be set by means of the rheostat. When the pointer is at this mark, the instrument is direct reading. In other words, measures directly in foot candles. So much for the electrical equipment.

The light measuring portion consists of the lamp above mentioned enclosed in a little box. The light of this lamp is projected into a wedge shaped box, painted white on the inside. Obviously, the further end of this wedge will be less bright than the end near the lamp. The top of the wedge shaped box is covered with a sheet of rather heavy cardboard through which a series of small circular holes are punched. The cardboard, in turn, is covered with a thin tissued paper. What is the effect of this combination? These holes will appear of different degrees of brightness, depending on whether they are near or far from the lamp. Now suppose light from some external surface falls on this piece of tissue paper. It will illuminate it to a certain brightness. The holes near the standard lamp will probably be brighter than the rest of the screen or paper, while those away from the lamp will appear darker. Somewhere between, the hole and the surrounding paper will appear equally bright. In other words, the spot of light will practically disappear. This is then the point of balance. It is then only necessary to mark on this tissue paper a set of values indicating the foot candles at the point where the hole and the surrounding surface is equally bright.

The first step in the operation of the foot candle meter is to be set the voltmeter needle at the point marked on the scale. This should be checked frequently during the test to see that the voltage of the battery has not varied. The meter is then placed on the machine, desk, wall, floor or wherever it is desired to know the intensity of illumination and the reading taken.

Shadows Must be Considered

In measuring illumination intensities, the operator should bear in mind the fact that his shadow, if allowed to fall on the instrument, will affect the reading to a considerable extent. In general, unusual shadows should not be introduced and usual shadows such as those of a workman at his lathe should not be avoided, although of course the purpose of the test is the governing factor in this connection.

For example, if one desires to measure the illumination at a desk under working conditions, he would sit in the position ordinarily taken by the one who uses the desk, in order that shadows on the instrument and hence on the work, will be natural.

Rule 3 reads that lamps shall be suitably shaded to minimum glare. Strictly speaking from a safety and eye protecting standpoint, this is the most important rule of the code. On the other hand, as I mentioned before, it is impossible to measure glare or specify it definitely. Modern light sources are far too brilliant to be looked at for any length of time. Some means must be provided to protect the eye of the worker from this bright source. This protection may take the form of an opaque shield or of a diffusing medium which enlarges the apparent size of the source and so reduces its brightness; or lamps may be so placed that they do not come in the ordinary angle of view. Metal reflectors of proper design hiding the filament from direct view form the first class. Translucent glass reflectors or diffusing enclosing globes form the second class.

It would require much more time than is available now to analyze every feature appertaining to glare. A few general hints must, therefore, suffice.

A reflector so small that the lamp projects away beyond its proper limits is obviously not suitable. The old style flat reflectors with no shielding effect are not adapted for use with the latest types of lamps. In general, it is well to hang lamps high. This is one of the best methods of eliminating the cause of glare. Hanging lamps high does not reduce the average intensity of illumination throughout the room, for the proper reflector can be chosen to bend or reflect the light rays in such a manner that the high hanging is compensated for with a more concentrated distribution of light from the reflecting equipment. Glaring reflections from the objects illuminated also must be avoided. For example, polished surfaces reflect the images of lamp filaments, etc., and this reflected light is almost as annoying as the direct light from the lamp itself. Under such conditions, special precautions should be taken in equipping the lamp so that this trouble is avoided.

There are a number of types of special lighting devices on the market which, although somewhat more expensive, practically eliminate this trouble.

The determination of the degree of satisfactory compliance with the law in regard to rule 3 will be at the present time largely a matter of experience and common sense. The experienced man with trained powers of observation can form a reasonably reliable opinion as to whether an installation is glaring and hence objectionable from this standpoint.

A similar statement applies to rule 4, which treats of the distribution of light on the work. One can see whether objectionable shadows are produced or whether there are sharp contrasts in intensity. For some work too diffused a light is not well suited and certain shadows are necessary, an instance of this being in the mould shop of a foundry where the contour and shape is determined largely by rather sharp shadows. For this very reason it is impractical to state in definite terms that the ratio of intensity between minimum and maximum light shall be of a certain value as determined by the reading with the foot candle meter. It is better to determine for one's self whether certain shadows are objectionable or not.

The Effect of Dirt Accumulations

Rules 5, 6 and 7 are practically self-explanatory, and not being directly connected with the lighting results are somewhat out of the province of my talk to-day. The appendix to the code has been quite carefully gotten up with the view to guiding practice so that it will meet the requirements and so that the non-technical man can improve his lighting without undue expense. The treatment on natural lighting is comprehensive and well worth careful consideration by every plant. Daylight is practically free to all intent and purposes and should be utilized to the greatest extent. One of the most important phases frequently overlooked in the utilization of daylight is treated on page 11 under dirt accumulations. I am quite safe in stating that in the great majority of factory buildings, windows do not receive the attention they deserve. Dirty windows do not only cause the plant to present a slovenly appearance and general untidiness, but they mean either a continual burning of lamps or turning on artificial lights at an earlier hour. Tests were recently conducted on the windows of an office building in the neighborhood of Newark, which had not been cleaned for some time, and which might be described as moderately dirty, and they were found to absorb 50 per cent of the light. Tests on some of the really dirty factory and shop windows indicate that the absorptions run well over 80 or 90 per cent. Bring up little points like this when discussing the matter with the plant manager. Show them that you have a real interest in the successful operation of the establishment. In this way you will benefit the community as a whole and the good will gained will amply repay you for the effort expended.

In Section 2 of the Appendix a discussion is given on the value of adequate illumination. I have covered some of these in my introductory remarks. You, as contractors and salesmen of lighting installations, should study this section quite carefully as it will provide you with talking points of remarkable value.

Sections 5, 6 and 7 present hints as well as illustrations which will be of value in planning the new and improved lighting systems.

In Section 11 a brief statement is made as to the functions of a reflector. It is true that light could be produced by lamps without reflectors. Nevertheless, it would be utilized most ineffectively if reflectors were not provided to direct the light where required. I would not make as broad a statement as to say that every lamp throughout a plant needs a reflector, but I believe I am fairly safe in stating that at least 85 per cent. require them.

The Importance of Light Colored Surroundings

Brief mention is also made in this section of the desirability of light colored surroundings. Paint is a wonderful adjunct to the lighting system. It enables one to obtain the desired illumination with a minimum expenditure for energy. Increasing the co-efficient of reflection of the side walls and ceilings greatly improves the light on the work. An occasional coat of paint shows a big return in the reduction of the lighting bill. Mention such a fact as this to the man interested. If it is not apparent at once, get him to try it out in a single room and compare it with a similar room with the typical dingy surroundings. The comparison will be so striking that he will not hesitate long in adopting your suggestion, and this may be a powerful entering wedge for his business.

Some important suggestions are also given on the maintenance of a lighting system. If you sell a man a motor, you usually give him an instruction card telling him how to oil the motor, adjust the brushes and the like. If you did not do this and he did not attend to the matter through his own appreciation of the subject, the motor would soon stall, burn out, and you would be justly blamed. On the other hand, many a lighting installation is sold with no instructions or suggestions as to its maintenance. There is a generally prevalent opinion that after the lamp and reflector are hung up the lighting system will operate satisfactorily for an indefinite period, with the occasional replacement of a burned out or badly blackened lamp. This is not the case. A lighting system demands careful maintenance. If it does not receive it, soon the intensity will drop so low that the men cannot see to perform their work. You will get the blame. You will be told that the installation you designed and installed is not adequate for the purpose. Your engineering judgment will be criticised.

Lamps and reflectors should be carefully cleaned at regular intervals, as an imperceptible accumulation of dirt or dust materially reduces the output of light and hence the resultant illumination. Many an unsatisfactory lighting installation has been made entirely satisfactory by the simple expedient of a little elbow grease, soap and water.

The more modern systems of semi-indirect and totally indirect lighting are particularly susceptible to this accumulation and your well planned system will receive a bad black eye if it is allowed to be neglected. Force this point home and save future trouble.

How I Increased My Sales 100 Per Cent.

There was a period in my selling career when I was merely intent on selling electrical appliances. Indeed, I was so saturated with the idea of placing appliances in everybody's home that I grew impatient at the stupidity of customers who failed to become as enthusiastic as myself. It was evident that far too many people showed no interest whatever in these things.

Then I had an inspiration!

"All wrong," I said to myself. "You're barking up the wrong tree. Your chief aim in life may be to sell electrical appliances all right, but who cares about that? Nobody's going to buy an iron or a toaster or a vacuum cleaner or a range or a washing machine to ornament his home with. The man or woman working in a dim room doesn't want lamps—he wants **light**, and he really doesn't care whether you make it for him with a lamp or a broom-stick." And so, as I said, I had an inspiration. What the people want is not "appliances," but "service." They want to know what the appliance will **do**. The thing that does it and the price that thing costs is a secondary consideration.

So I set myself to forget that I had anything else to sell but "service."

And, the first discovery I made was that you can't sell "service" without samples—in other words you've got to **demonstrate**. It doesn't matter what you are handling, it's always the same. The housewife wants clean carpets—so I sell her clean carpets; or crisp toast, or better coffee—I sell her those things, without mentioning toaster or percolator. The interchange of the money for the article is a mere mechanical detail that follows as a matter of course. Sell the **idea** and you can't block the sale of the appliance however hard you try.

That reminds me of the way a friend of mine sells lighting and power plants. You know the usual way—get the farmer into your office where you have a plant or two all set up with an elaborate system of pipes and condulets, concrete foundation, elaborate control and so on, and then you you try to explain all the various advantages, while the farmer's head grows dizzy. Not so with my friend. He bought a Ford motor truck, loaded one of his plants on it, covered it with a neat canvas dog-house and hied him out to the country—no, not early in the morning when everything about the farm was bright and gay, nor yet in the middle of the afternoon when the farmer was rushed off his feet, but—why, just as the evening was drawing in, of course, and the farmer was finishing his evening meal and calling for a lamp to read his paper. Then my friend showed his human side. He didn't talk "plant" to the farmer. He pulled out 100 feet of flexible cord, ran it into the house over the farmer's chair, started his engine and, ecco—the thing was done. Then he let the members of the family carry the light around to the various rooms, look into the many dark corners that they had never really had a chance of looking into before, feel the warmth and life of a really well-lighted home and waited for the pressure to buy that he knew would be exerted on the father.

That is what I call salesmanship, eh? That's the kind of thing that's going to place electrical appliances by thousands in the homes of consumers in the near future, if we only remember that our business is selling the **idea** of what electricity **does** for the human race.

That Campaign of Education

Mr. Frank T. Groome, sales manager Benjamin Electric Company, is vigorously pressing his campaign of education among the contractors of the province. Already he has addressed meetings in London, Toronto, Montreal, Hamilton, Kitchener and Brantford. Mr. Groome says his plan appeals to contractor-dealers and others particularly on account of the "efficiency" of the idea. If he can explain the use and properties of his devices in the space of an hour or so in the evening when the men are off duty anyway, he not only saves a lot of time for himself, but also saves good working daylight for everybody else. Further, it is practicable to make a demonstration before such a meeting much more complete than would be possible in a private office.

The meeting in Hamilton on the 19th was a splendid success. Mr. McIntyre was there too and explained the way the Toronto contractor-dealers are working together. He also told them about the open-price plan which is now in full operation among Toronto electrical contractors.

How Much to Spend for Advertising

Contractors and dealers often are puzzled to determine what percentage of their gross business to spend in advertising. There is no one fixed percentage that would be suitable for all to use; conditions as they exist in the particular concern's community and within that concern's business really control the matter.

A certain New York City contractor devotes 3½ per cent. of his gross business of a fraction over $35,000 to cultivating his mailing list of about 600 names, and to maintaining an advertisement in the classified telephone book. Whereas, another contractor, in a Western city, who has a much smaller list, but more difficult competition to face, feels that he is justified in spending 8 per cent of his gross to get business.

For advertising a retail electric shop, from three to five per cent. of the gross business is considered by many dealers to be about right. Some large merchandising establishments where the gross volume is very considerable are able to advertise effectively even upon a smaller percentage.

If you are spending a fixed sum yearly, check that figure against your gross business and find out what the percentage is. Find out, too, if you can, what approximate amount your competitor spends. Check the growth of your business month by month against your advertising increase. In all probability you will find that as you increase your expenditure for advertising that your gross business increases also. —Monthly Sales Service.

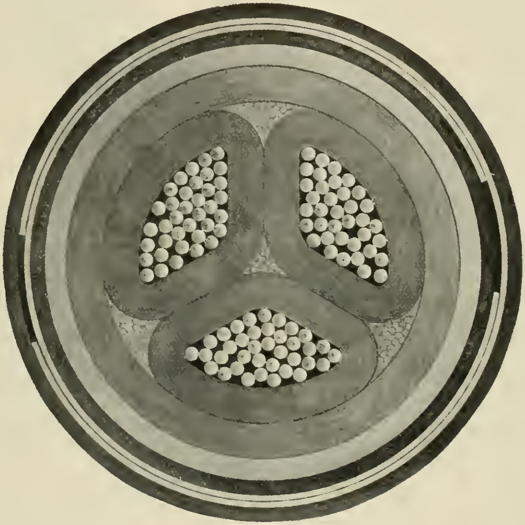
New Commission Order

Manufacturers of cabinets and cut-out boxes have been advised by the Hydro-electric Power Commission of Ontario that on and after April 1, 1919, all cabinets and cut-out boxes offered for sale in Ontario must bear the approval label of the Commission. In lieu of this label, the label of the Underwriters' Laboratories may be accepted at the option of the Commission.

The death occurred recently of Mr. Herbert W. Kent, manager of the Northern Electric Company at Vancouver, B.C. Previous to going with the Northern Electric Company he had been for many years manager of the B. C. Telephone Company. His home town was Peterboro, Ont., where the remains were taken for interment

Renfrew Electric Products, Limited, Renfrew, Ontario, have been granted a Dominion charter.

POWER CABLE



350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

---

Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary Vancouver

Current News and Notes

Barrie, Ont.

The annual statement of the Barrie electric light department for 1918 shows a gross surplus of $8,371.19, which, after deducting a depreciation allowance of $3,517, leaves a net surplus of $4,854.19. Total earnings for the year were $35,239.

Chatham, Ont.

The annual report of the Chatham Hydro-electric System for the year 1918 shows a total revenue of $73,110—an increase of 36 per cent. over 1917. The total operating costs, including power purchased and all charges for debenture account and interest were $66,647, leaving a surplus of $6,634. Of this amount $5,318 has been transferred to the depreciation reserve. In addition to the sale of current, the Commission carried on, without loss, a business amounting to $42,387 in electrical appliances and wiring.

Collingwood, Ont.

The Bell Telephone Company, Collingwood branch, have moved into their new office building, corner Hurontario and Third streets. Modern equipment has replaced the old system.

Edmonds, B.C.

Officials at the plant of the Pacific Smelting Company's works at Edmonds, B.C., state that through electric smelting they are able to manufacture calcium carbide giving five per cent. higher gas yield than that manufactured under the older method. It is stated that plans are being drawn for a large and permanent plant for this company.

Halifax, N. S.

A number of municipalities and industries in the New Glasgow district are endeavoring to have the Government appoint a competent engineer to look into the question of cheaper power. This engineer would be asked to report on the feasibility of developing Hydro-electric power at Sheet Harbor, about 80 miles distant, and also to report on a plant for developing power from coal at some central point.

Hamilton, Ont.

The Hydro-radial by-law recently submitted to the ratepayers of Hamilton, Ont., carried by a majority of 2,637. The by-law also carried in Nelson township, but was defeated in Saltfeet township.

London, Ont.

The London & Port Stanley Railway Company will erect new station buildings at St. Thomas and Port Stanley to cost about $12,000 each.

Montreal, Que.

Wireless telephones are being installed in the Montreal Board of Trade offices. These will enable brokers to communicate with Kingston, Ottawa, Three Rivers and Quebec.

Ottawa, Ont.

The ratepayers of Ottawa, Ont., recently voted in favor of taking over the street railway and application is being made to the Ontario Legislature for the necessary authority. Control of the railway will be vested in the Ottawa Hydro-electric Power Commission.

Perth, Ont.

The town council of Perth, Ont., have granted the Hydro-electric Commission amounts totalling $60,000 for the completion of work in connection with changing over the local system to Hydro.

St. Thomas, Ont.

The city council of St. Thomas, Ont., will prepare a by-law for submission to the ratepayers, authorizing an expenditure of approximately $50,000 for improvements to the street railway. The changes recommended include $7,000 for remodelling seven of the present street cars into "one-man" cars with single trucks; $3,000 for five new equipments at $600 each; the balance of the $50,000 to be used for replacing the old rails on Talbot street with 80 pound rails; reconstructing the car barns; installing new overhead equipment, new frogs and switches where necessary; new uniforms for the men and other renovations. Figures are also being prepared, and a by-law may be submitted, authorizing a sufficient expenditure to cover the cost of extending the Elgin street line.

Stouffville, Ont.

It is proposed to submit a by-law to the ratepayers of Stouffville, Ont., on the question of introducing Hydro power and scrapping the present municipal power plant. This plant is operated by steam and since the coal shortage there has been much inconvenience caused by shutdowns.

Sydney, N.S.

The Cape Breton Electric Company, Limited, Sydney, N.S., have been granted a six-cent fare on their local lines and in each zone of the Glace Bay division.

Winnipeg, Man.

E. P. Rothwell, of Winnipeg, has been awarded the contract for wiring the C.P.R. station.

Toronto, Ont.

The annual report of the Toronto Hydro-electric System for the past year shows a gross revenue of $2,353,443 made up as follows: Lighting, $743,914; power, $982,859; street lighting, $300,594; Exhibition, $15,748; current supply in bulk to other municipalities, $245,856; income from other sources, $64,472. The expenditures were: $842,251, cost of current; $661,361, cost of operation and management; and $846,164, fixed charges, interest, and sinking fund, a total of $2,231,776, showing a net profit in the year's operations of $21,666. The assets of the system are valued at $10,628,232, with gross liabilities of $10,564,253, showing a surplus of assets totalling $63,979.

Personals

Mr. Fred Thomson, of the Fred Thomson Co., Ltd., Montreal, is recovering from a severe attack of rheumatic fever.

Col. Geo. C. Royce, who has been spending a few weeks in the South, getting a much needed rest, has returned much benefited by the trip.

Mr. S. L. B. Lines, general manager of The Chamberlain and Hookham Meter Company, sailed for England on Monday, March 17th. He expects to be absent four or five weeks.

Mr. T. B. Macaulay, president and managing-director of the Sun Life Assurance Company of Canada, has been elected a director of the Montreal Light, Heat and Power Consolidated, to fill the vacancy caused by the death of Sir Rodolphe Forget.

Mr. Albert Schofield, of the Ferranti Electrical Company of Canada, has just returned from overseas. He was first stationed at Saloniki, but later was appointed an officer of the Royal Engineers, operating in France. Mr. Schofield's old friends in the trade will be glad to greet him when he calls on them as usual during the next few weeks.

Mr. Lawford Grant has resumed his former position as managing-director and treasurer of the Eugene F. Phillips Electrical Works, Limited, Montreal. The vacancy on the Board of Directors caused by the death of Mr. G. H. Olney has been filled by the appointment of Mr. A. J. Carroll. Mr. R. H. Balfour has been appointed assistant-treasurer, and Mr. A. Richards assistant-secretary.

Of All The Better Makes In America

EUREKA Vacuum Cleaners

Won The Grand Prize at Panama!

SELL EUREKAS

A household necessity--NOT A LUXURY.

Write us for prices, etc.

Eureka Vacuum Cleaners are the only Vacuum Cleaners judged by impartial experts to be 100 % EFFICIENT.

Constructed with one object only in view—TO GET THE DIRT.

Positively guaranteed to get the dirt when others fail—to be mechanically perfect--and to give better satisfaction in sales and service than any other vacuum cleaner.

Onward Manufacturing Co., Kitchener, Ontario

Linking your Lighting Business
to the Business of Building

Faith and true courage are about to be shown in the business of building—the vital business right now.

Your business—the business of lighting—is a vital part of every building. Link your business close to building, make it a power for progress and prosperity. You have in

Cora The Glassware for Efficient Lighting

a ready aid in substantial sales building. The uniform quality of "Cora" is the direct way to lighting efficiency and beauty—and lasting prestige for you.

For every lighting requirement where electricity is used there is a well adapted "Cora" Globe, Bowl, Reflector or Fixture.

The unit here illustrated is particularly suitable for the dining room. It gives soft concentration of light on the table, yet retains the full beauty of the semi-indirect bowl.

"Cora" Catalogue No. 45 is a book every Fixture Dealer needs. Just write for it to-day.

Consolidated Lamp and Glass Co.
CORAOPOLIS, PA.

WM. P. GARVIN, Canadian Representative,
62 King Street East, HAMILTON, ONT.

Condensed Department

Publisher's Notice

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

ELECTRICIAN, experienced in the operation of hydro-electric power plants and at present superintendent of plant, would like similar position. Apply Box 888, Electrical News, Toronto, Ont. 6-9

Induction Motors Wanted

One each 15, 25, 35, 50 H.P., 550 volt, 60 cycle, 2 phase. Would consider other voltages or three phase. State full particulars and best cash price. Address Box 843, Electrical News, Toronto, Ont. 3-t.f.

Small Transformers FOR SALE

A number of 600 watt and 1000 watt C. G. E. type H transformers for sale at very low prices. Guaranteed O.K. Pay for them after you try them out on your own lines.

Stormont Electric Light Co.,
Cornwall, Ont.
7-8

Prepayment Meters FOR SALE

60 Ferranti 5 and 10 amp., 110 volt, types B & C geared for 7 to 10 cent rate, in first-class condition. Will accept 55 per cent. present cost new meters. Address, Hydro-Electric Power Commission of Ontario, 190 University Avenue, Toronto. 7

For Sale

1 150 H.P. Corliss Steam Engine, made by Cowan & Co., Galt, Ont. Girder frame, left hand drive, side crank, 13' x 26" fly wheel.

Will sell at a bargain.

Full particulars on application to

Hydro Electric Commission,
of St. Thomas, Ont.
5-t.f.

Electrical Energy Control in England

Control of the generation and distribution of electricity throughout the United Kingdom is proposed by a bill now being prepared by the government. Authority over the electric supply, which is now vested in the Board of Trade and other government departments, would be transferred by the bill to a very small board, having probably only five members.

The United Kingdom would be divided into districts, the board members having in mind, first of all, the requirements of industrial sections. In each district a subsidiary board would be appointed to take direct charge.

All electric power stations would be purchased and placed in the hands of the local boards, each of which would be held responsible for the supply of electricity in its district, and for the establishment of new generating stations and transmission systems.

If private companies wish to enter the electric business, they would be compelled to buy their current from the local board and their earnings would be under control.

It is suggested that the local boards would only meet expenses and pay no profits. The financing of the plan would be in the hands of the government, except where it is practicable and advisable to finance the plan locally.

This plan is brought forward as a compromise between public and private control. The report upon which the bill is based was made by a committee which conducted a careful investigation. It points out that the electric system of the country is inadequate and recommends the adoption of a plan which will meet the requirements.

Importance of Industrial Heating Load

In an address before a recent meeting of the new-business men of the Ohio Electric Light Association, Mr. Wirt S. Scott, of the Westinghouse Electric and Manufacturing Company, stated that with the same energy devoted to the development of the industrial heating load that was given in the development of the motor load, greater progress can be made in less time. Mr. Scott said in part:

"The industrial heating load is so diversified that it is possible to find a load which will fit in any valley of any power curve. Even the noon-hour off-peak period can be utilized for some specific operation which can be done at that time just as well as it can at some other period of the day.

"Many cases have come to our attention recently where the customer who was willing to electrify and had been turned down by the central station on account of the overload condition of the power plant during the day-time jumped at the chance to operate at night. In every case it had not occurred to the customer that the central station possibly could perform his particular heating operation at night just as well as during the day, and at much less expense, since the fixed charge for the power in many cases was taken care of by the day load, the night load being therefore obtained by the central station on a straight energy-cost basis.

"In the development of the motor load it was necessary for the central station to have specially trained men who could talk intelligently to the prospective customers and who had sufficient knowledge of motor application work to be able to secure the necessary data, so that either by their own knowledge or through a source of information they knew to be available, either in their own organization or in that of an electrical manufacturing company, the salesman could go back to the customers with the correct answer. Just as this was true of motor application work, so it is true of industrial heating.

"In order to develop the industrial heating load a vast amount of missionary work must be done, and the sooner these initial stages are passed just that much sooner will the central stations begin to reap the benefit of their efforts."—N.E.L.A. Bulletin.

PETRIE'S LIST
of NEW and USED
MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
2	52	3	25	550	720	Lancashire
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	30	2	60	220	720	Fbks.-M.
1	25	3	25	550	725	Westg.
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	20	3	25	550	710	Westg.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	15	3	25	550	710	Chap. & W.
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	Westg.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
1	5	3	25	550	1400	Excelsior
4	4	3	25	550	1400	Excelsior
2	3	3	25	550	1500	C. G. E.
4	3	3	25	550	1400	Excelsior
1	2	3	25	550	1440	Excelsior
1	1/6	1	60	110	3400	Diehl

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Front St. West - Toronto, Ont.

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Generation, Transmission and Application of Electricity

Published Semi-Monthly By

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VANCOUVER - Tel. Seymour 2013 - Winch Building
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Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

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Organization Perfected to Promote the Use of Electric Furnaces

Important steps were taken to promote the use of various electric furnace products, at a meeting called by Mr. Acheson Smith, vice-president and general manager of the Acheson Graphite Company, held at Niagara Falls, N. Y., on Friday and Saturday, March 21 and 22. Mr. Smith made a general statement of the importance of getting before the consumers of electric furnace products, and the public generally, the many great advantages of the use of electric furnaces, and the uniformly high grade products which are made by them. He asserted that it was his belief that all interested in the matter could join together on a common basis to extend the use of electric furnaces and their quality products. A special emphasis was laid on electric steel, the tonnage of which during the past four years has shown a remarkable increase throughout the world. This has been brought about for two important reasons, (1) the higher quality which can be made by use of the electric furnace, (2) and the lower cost of operation shown in most cases as compared with the previous method of manufacture. The meeting passed resolutions inviting all manufacturers of electric furnaces, electrical apparatus, electric furnace supplies and accessories, public utility corporations, designers and inventors of electric furnace equipment, and the users of electric furnaces to become members and to join in making an aggressive and thorough campaign to disseminate to engineers and to the public accurate data as to the quality of electric furnace products of all kinds. A splendid start was made in an organized way to carry out these plans. The meeting was attended by representatives of a large number of companies representing manufacturers of electric furnace equipment, accessories, utilities, supplies, designers and inventors, and manufacturers of electric steel. A permanent organization, to be called the Electric Furnace Association, was created, with Mr. Acheson Smith, Acheson Graphite Co., Niagara Falls, as president, and M. C. G. Schluederberg, Westinghouse Electric Mfg. Co., Pittsburgh, secretary.

The president was authorized to get in touch with all companies and persons who should be interested in joining the organization, and was requested to arrange an early meeting when completed publicity plans could be presented and thoroughly discussed. In the meantime the different committees were instructed to make every effort to rapidly perfect reports which could serve as a basis for constructive work. It is quite likely that the next meeting will be held in New York City the early part of April, at the same time as the Spring meeting of the American Electro-Chemical Society.

The Evolution of the Telegraph

Mr. C. E. Davies, tariff superintendent of the G. N. W. Telegraph Co., Toronto, spoke on the "Evolution of the Telegraph" at the Montreal Electrical Luncheon on March 26th. After a brief historical sketch of the invention of the telegraph, Mr. Davies referred to the use of the automatic apparatus, and its extensive adoption during the last five years. The G. N. W. now had 24 automatic sets for 17 circuits, handling 50 per cent of the 24 hour load. In Montreal 72 per cent of the entire traffic was dealt with by the automatic machines; 250 messages could be sent and received during an hour if conditions were favorable. On the Multiplex page Morkrum machines 800 messages per hour had been delivered. Automatic machines were more efficient from the point of view of errors and less costly to operate. Mr. Davies mentioned that in the early days the operators used to take the messages by ear instead of reading them from the tape—this was against orders, which showed that sometimes the operators had a sense of greater efficiency than the officers. There had been many inventions with a view of perfecting the automatic machines, but experience showed that the polar-duplex principle was the only one that had been successful. Of the 600 automatic machines invented, about six were in use today.

Mr. Davies then explained by a number of slides the principle on which the Morkrum machine operates and also the technical principles underlying the sending and receiving of multiplex messages. The final slides, showing the great damage done to lines by storms, was to explain the reasons, as Mr. Davies put it, "you sometimes do not receive your messages promptly."

The Luncheon passed a resolution favoring the Bill for daylight saving.

Toronto Section A. I. E. E.

The April 4 meeting of the Toronto section of the American Institute of Electrical Engineers though not of a specially technical nature was nevertheless full of personal interest for the record attendance which gathered to hear Mr. George D. Leacock in his "reminiscences" on the good old days when electric light plants were novelties and the 16 candlepower lamp a seven days' wonder. A meeting was also held on April 11—the long delayed Hamilton meeting—when Mr. G. E. Stoltz, of the Westinghouse Electric & Mfg. Company, East Pittsburgh, addressed the members on "Steel Mill Electrification."

The annual meeting will be held in the Engineers' Club, 96 King St. West, Toronto, on Friday evening, April 25. Mr. W. B. Buchanan, of the Ontario Hydro Laboratories, will deliver an address on "Some Overload Limitations of Current Transformers." The election of officers will follow, nominations for which have been received as follows:

Chairman, Ashton B. Cooper, Canadian General Electric Company.

Secretary, Daniel M. Fraser, Canadian General Electric Company.

Executive, L. B. Crubbuck,* Canadian Westinghouse Company; C. C. Clark, Swedish General Electric Company; H. C. Don Carlos, Ontario Hydro-electric Power Commission; F. R. Ewart, Ewart & Jacob; C. Sisson,* Canadian General Electric Company; W. Volkman, Toronto Power Co.

*Out of town members.

J. C. T. O. Representatives

The following representatives have been elected to the executive of the Joint Committee of Technical Organizations for the year 1919-20:

Jas. McEvoy, Can. Mining Institute, Toronto Br.; H. G. Acres, Engineering Institute of Canada, Toronto Branch; R. R. Grant, Association of Ontario Land Surveyors; D. E. Beynon, Society of Chemical Industry, Canadian Society; W. P. Dobson, Engineering Alumni Association, University of Toronto; T. U. Fairlie, Engineering Alumni Association, Queen's University; J. B. Carswell, Engineers Club; Harry Jewell, Royal Canadian Institute; J. E. Walsh, Canadian Manufacturers' Association; Maj. L. L. Anthes, Canadian Engineers, Mil. Dis. No. 2; C. B. Hamilton, Jr., American Society of Mechanical Engineers, Ontario Section; F. R. Ewart, American Institute of Electrical Engineers, Toronto Section; E. V. Pannell, Institution of Electrical Engineers; R. K. Shepard, Ontario Association of Architects; elected members, G. A. McCarthy, W. A. Bucke, secretary, Major R. D. Galbraith; treasurer, R. R. Grant. The chairman is Mr. Wills Maclachlan.

Ontario Hydro Further Reductions in Rates

The Hydro-electric Power Commission of Ontario have announced the following reductions in rates to various municipalities. This will doubtless result in reduced rates to the ultimate consumers, but these latter have not yet been determined. It will be noticed that the figures range as low as $15.00 per horsepower:

	Power	
Municipality.	Present Rate	New Rate
Port Credit	$27.00 per h.p.	$25.00 per h.p.
Weston	30.00	25.00
Mimico	27.00	25.00
New Toronto	27.00	25.00
Woodbridge	33.83	33.00
Guelph	20.00	19.00
Acton	36.00	35.00
Kitchener	20.00	19.00
Waterloo	21.00	20.00
Wellesley	39.96	39.00
St. Jacobs	32.44	32.00
Stratford	27.00	25.00
Milverton	35.63	35.00
Listowel	37.41	37.00
Drayton	60.45	60.00
Moorefield	63.93	63.00
Tavistock	37.01	36.00
Woodstock	21.00	20.00
Tillsonburg	35.00	32.00
Norwich	38.00	35.00
Beachville	28.00	27.00
Burgessville	48.38	48.00
London	21.00	19.00
Lucan	47.74	40.00
Ailsa Craig	49.67	49.00
Granton	48.61	48.00
Exeter	41.66	41.00
Hensall	47.76	47.00
Dashwood	56.75	56.00
Simcoe	35.00	32.00
Chatham	30.78	29.00
Wallaceburg	38.45	38.00
Dresden	43.00	42.00
Petrolia	36.26	36.00
Oil Springs	38.54	38.00
Brigden	57.56	57.50
Wyoming	38.34	38.00
Forest	63.27	63.00
Ridgetown	47.17	47.00
Zurich	69.34	69.00
Strathroy	44.07	42.00
St. Thomas	26.00	24.00
Aylmer	39.00	38.00
Dutton	43.53	43.00
West Lorne	55.60	55.00
Brantford	19.00	18.00
Paris	21.00	20.00
Highgate	51.82	51.00
Windsor	38.00	36.00
Walkerville	38.00	36.00
Stamford Township	16.57	15.00

Power on the Nelson River

The Nelson River is of first importance, forming the outlet of one of the main drainage systems of the continent. The territory tributary to this river has a very wide range in physical features. It varies between the rugged and mountainous country of the Continental divide and the flat low-lying swamp area of the lower Saskatchewan. The variation in vegetable cover is great, large area being covered by dense forest growth, as compared with the open stretches of the western prairies. In the south-western part of the drainage area the soil cover is deep and few lakes are to be found, while in the eastern and northern sections the soil is generally thin, the rock is largely exposed, and many lakes are scattered throughout the territory.

The immediate source of the Nelson River is Lake Winnipeg, which acts as a collecting basin for greatest part of the drainage area. It forms one of the largest fresh water bodies on the continent, with a surface area of 9,414 square miles. The principal rivers draining into the lake are the Saskatchewan, Dauphin, Red and Winnipeg.

The total drainage area of the Nelson River is 450,000 square miles. With such a large area the run-off may be expected to be large. The length of the river is approximately 450 miles, and in this distance the total fall is 715.00 feet. The greater part of this fall is concentrated at the numerous falls and rapids which occur throughout the length of the river, and it is this feature, coupled with the large discharge, that makes the Nelson River so important from a power producing standpoint.

In the upper reaches the Nelson River is made up of a number of lake-like expanses connected by short stretches of river which are generally broken by rapids and falls. Between Sepiwisk and Split Lake is a large stretch of river free from islands and interrupted by very few rapids. Below Split Lake numerous islands are encountered and the rapids and falls are numerous. Rock outcrops are in evidence at practically all the rapids. The banks are generally higher in the lower reaches and the rock is covered with a greater overburden of clay. The river is navigable by small boats between the rapids, but except at the upper and lower ends the reaches open to uninterrupted navigation are short. The Hudson's Bay Railway crosses the river at two points, Manitou and Kettle Rapids. Above and below these points the railway is never at a great distance from the river, hence access to it at various points is comparatively easy. In the event of power development at any point only very short spur lines would be required.

No systematic surveys have been made to determine possible points at which the fall in the river might be concentrated, but from various observations the height of the falls has been very closely ascertained. On this account it is necessary in discussing the probable power output of the river to base the estimates on the fall at the various rapids and falls without any reference to the best method in which the whole fall might be utilized.

Regarding the discharge of the river more definite information is available. Estimates of daily discharge, based upon measurements made at Shell Rapids by officers of the Manitoba Hydrometric Survey and observed gauge heights at Norway House are available for a term of years. These indicate what may be expected as a probable minimum flow, also the probable regulated discharge by developing storage on Lake Winnipeg.

Lake Winnipeg offers splendid opportunity for the development of storage, as very little range in lake level (from one feet to two feet) would provide for almost complete regulation of the Nelson River. This undertaking would involve considerable expenditure, but will be quite feasible economically when any considerable developments of the water powers on the river has been accomplished.

From the records referred to the following figures relating to discharge of the Nelson River have been prepared:

Ordinary minimum flow	50,000 c.f.s.
Estimated flow for maximum development	80,800 c.f.s.
Dependable flow with storage	75,000 c.f.s.
Maximum recorded flow (Norway House)	122,000 c.f.s.
Minimum recorded flow (Norway House)	42,750 c.f.s.

From these figures it will be seen that the natural regulation is good, the variation between maximum and minimum flow being small, which is a much desired feature where hydraulic developments are concerned.

Regarding the head available at the various rapids and falls, this can only be finally determined by careful surveys, but the natural drop varies from 10 to 50 feet; they are, therefore, all low head propositions. This disadvantage is largely offset by the magnitude and small variation of the flow. The developments would all be large undertakings, but the opinion is ventured that the capital cost per horse power developed will compare very favorably with similar undertakings on this continent. As a measure of the size of any development the amount of power available per foot of head calculated at 80 per cent efficiency for "ordinary minimum flow," "estimated available for maximum development," and "dependable flow with storage," is 4,454, 7,345 and 6,817 h.p. respectively.

Available information indicate that 538 feet, out of a total fall of 715, may be developed at various points. Detailed surveys which must ultimately be made may decrease or increase this amount. In the aggregate the power that may be developed on the Nelson runs into very large figures. With the possible exception of the Columbia River, it has the greatest amount of potential power capable of development of any river on the continent. Upon the basis noted before the corresponding figures are 2,445,000, 3,952,000 and 3,668,000 h.p. respectively.—Manitoba's Northland.

University Training for Engineers

"I must go on to speak of the demand for first-class engineers. It is a very small demand at the best, but to fill that small demand is one of the most important tasks of American teachers and universities, because democracy does not lead only to raising the level, improving the capacity of the average man, but should lead to the development and profitable employment of men of superior ability in all sorts of human service. James Russell Lowell pointed out many years ago that unless democracy developed and set to work the highest types of human intelligence and character it would be a failure.

"I believe that to be a statement of absolute truth, gentlemen, not sufficiently understood and appreciated by the mass of educated Americans. The test of our form of government is going to be its capacity to develop scholars, research men, students and practical geniuses of the highest type. How is that to be accomplished?

"Does not the selection for the super-engineer or the super-statesman or the super-lawyer work well in this country—indeed, work quite as well as in any country—with this added advantage, that democratic society being plastic, not crystallized in layers as is society in some other countries, some of which are very impermeable, it results that throughout society, from bottom to top, there is a plasticity, a condition of yielding, with the natural impulse for talent to rise to all layers of society? That I believe to be one of the chief advantages of democratic society. It gives a man who has natural genius and superior talent a chance to go to the top. We had a wonderful case of that in Abraham Lincoln. It was because of democratic society and the opportunities which it offered that Abraham Lincoln attained his immortal vein.

"So I believe that these supermen whom we all want to bring forth in our democratic society will be brought forth, at any rate in many instances, and put in their proper places, and it is the first duty of our advanced institutions of education to provide for them every possible chance.

"What is the motive that, after all, must inspire these young men who are to become what we call here to-night the supermen? It is the scientific motive, gentlemen, the love of the occupation itself, and the satisfaction with their station in life which gives them the chance to devote themselves absolutely to the pursuit or the work that they love. Is not that the way in which all geniuses of the world have found their place? Is it not the way, in the future, that this country will be supplied with the men who are, after all, the leaders of all our progress in all our fields of endeavor and opportunity, exploitive of natural resources and exploitive of the human imagination?

"Now, gentlemen, the way to get for the service of the country these supermen is, I think, first utterly to change from the bottom to top the methods of instruction now used in the elementary and secondary schools and the colleges of the country. We never can get through our free schools the boys we want and the girls we want until the methods of instruction in the elementary and secondary schools are changed."—President Emeritus Eliot, Harvard University, before A.I.E.E.

An effort is being made by the Ottawa city council to acquire the light and gas plants of the Ottawa Light, Heat and Power Company. It is anticipated that the linking of the private company with the Hydro would be greatly beneficial to the city, although, at this writing, there is no indication that the company is prepared to sell.

Electric Equipment in Blooming Mill of Steel Company of Canada, Hamilton

The Electric Club of Toronto at their luncheon on Friday, March 21st, were favored with an interesting address by Mr. E. S. Jefferies, electrical engineer of the Steel Co. of Canada, Ltd., describing the company's blooming mill at their Hamilton plant. Before introducing his subject proper, Mr. Jefferies mentioned a new and amazing development in telephone work which had come to his notice. He had recently paid a visit to the laboratory of the American Telegraph & Telephone Co., which is in charge of Dr. Jewitt, who recently gave the Club a talk on the wireless telephone, and here he had seen a telephone device which transmitted the human voice without the use of mouthpiece, receiver, magnets, wire or batteries. This seemed almost incredible, but it was accomplished by the use of Epsom salts. He had actually heard a ground crystal of magnesium sulphate reproduce human speech, without battteries or any of the usual telephone equipment.

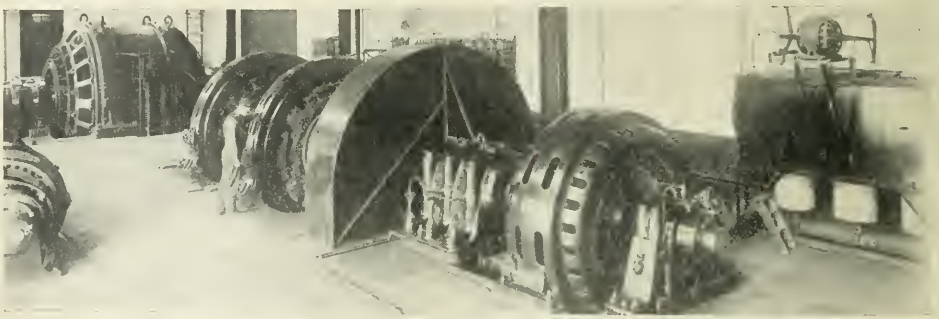
Mr. Jefferies had some interesting information to give on the use of electricity in the steel industries. He said that within the last ten years steel plants have adopted electric motors in nearly every motion in the mills and within the last four or five years for the driving of the main rolls where very large powered motors are required.

One factor tending to increase the motor application is the use of central station power instead of installing individual power stations. As an illustration of this point take the district around Canton, Ohio, where there are quite a number of mills taking power from one company. Hamilton and Toronto are also ideal examples of this, in that all the factories in these neighborhoods purchase power from two companies.

The United States Bureau of Census for 1912 gives the average kw.h. power generated in 1260 companies controlling the electric railways of the United States as four million eight hundred thousand kw.h. per company. Similar data for 5,221 electrical central stations including railway and lighting shows an average kw.h. generation of two million two hundred and two thousand per station. The foregoing compares with an average generation of nine million kw.h. for each of the 225 plants (approximately) engaged in the iron and steel industry in the United States.

To give some idea of the growth of the steel industries for the period of 1906 to 1916, it is interesting to note the tonnage produced and the horse power of the motors installed. In 1906 there was produced in the United States, 19 million tons of steel ingots, and during that year an averaged installation of 15 thousand h.p. in motors, whereas in 1916 there was approximately 39 million tons of steel ingots made and a installation of 118 thousand h.p., showing an increase of approximately 205 per cent in tonnage and 785 per cent increase in the rate of motor h.p. applied. These figures certainly are significant in that they show the tremendous rate of increase by the use of electricity in the making of iron and steel.

Coming to the actual description of the mill, Mr. Jefferies illustrated the equipment with a number of slides. He pointed out that when the steel is poured from the open hearth furnace it is in the form of ingots, 5 ft. long, 17 in. square at the top, and weighing about 4,200 lbs. In the process of rolling, the ingot is reduced to a cross-section of 4-in. square, and is elongated to about 70 ft. · This is accomplished by passing it back and forth between heavy rolls. At the beginning, the metal being short, the rolls have to reverse at great speed, and a large amount of power is required—is high as 7,000 h.p. for one second—while as the ingot lengthens, the reversal is slower, the speed is greater, and at the same time considerably less power is required; at the end of the operation 800 h.p. being used for a space of several seconds. The equipment used by the company is the Ilgner type. The set consists of a fly-wheel motor-generator set, slip regulator, and exciter, a reversing motor, and control apparatus. The motor generator set consists of an 1,800 h.p., 2,200 volt, 3 phase wound rotor induction motor; a 50-ton fly-wheel and two 1,200-kw., 600-volt d.c. generators, all mounted on a common shaft. The slip regulator or water rheostat, is operated by a torque motor, the current for which is delivered from a current transformer located in the main leads to the motor. The exciter is of 175-kw., 250 volt capacity and supplies all

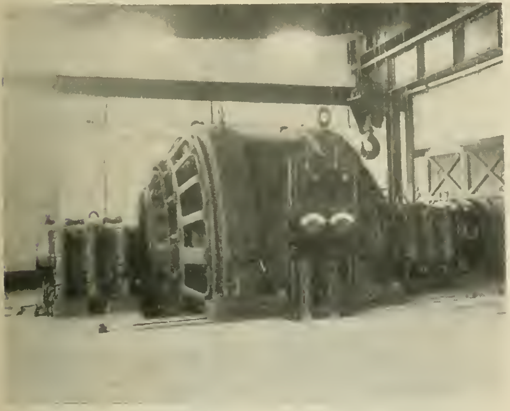


General view of Ilgner Set, Electric Rolling Mill, Steel Company of Canada, Limited, Hamilton, Ont.

current for the motor and generator fields. The mill motor is a shunt-wound inter-pole motor, two units on one shaft, rated at 3,000 h.p. (continuous) and capable of delivering momentary peaks of 9,000 h.p. The control consists of a vertically operated drum-type controller about the size of a street car controller, which operates shunt contactors. These shunt contactors control the direction and speed of the mill motor by changing the polarity and varying the resistance of the field circuit of the variable voltage generators. In order to prevent the motor from being over-loaded, a current relay placed in the main leads of the mill motor operates on overload and introduces resistance in the field circuit, thereby decreasing the field strength and generator voltage, which in turn limits the torque. The motor fields are excited constantly in one direction, but for speeding the motor for long passes, series resistance is introduced.

Characteristics of the System

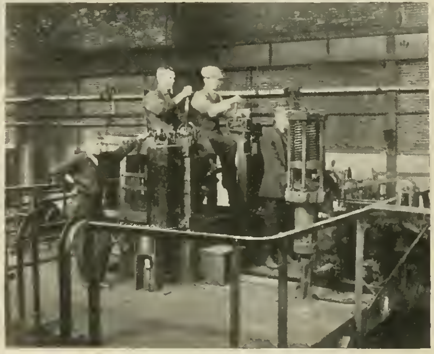
Mr. Jefferies next showed a number of curves illustrating the characteristics of the system—the kilowatt input to motor generator set, the variations in speed of the motor generator set, speed and direction of the mill motor, input of the mill motor etc. These curves, while not an average of observation, were typical curves taken simultaneously, and illustrated the action of the slip regulator and fly-wheel in minimizing the fluctuations in power demand. In this case the maximum input is about 1200 kw., the speed of the fly-wheel varying between 490 maximum and 435 minimum, whereas the load on the mill ran as high as 3,000 kw. As the rotative energy of the fly-wheel is proportional to the square of the speed at which it is turning, a reduction of 15 per cent in speed means that 27¾ per cent. of the whole rotative energy of the fly-wheel is absorbed during the short period of speed change. Normally between 15 and 20 per cent. reduction of speed is allowed.



Main Roll (Reversing) Motor, 3,000 h.p. continuous capacity

Mr. Jefferies pointed out that live steam was expensive to use for the reversal, as compared with the electrical equipment. In the latter, the motor is made to act as a generator and pumps back into the generators of the fly-wheel set, and the generators in turn deliver it again to the fly-wheel. In this way over 60 per cent. of the rotative energy of the mill motor, rolls, etc.—which, in steam driven mills, is lost—is returned to the fly-wheel and made available for use on the next pass. With the use of a steam engine there is also the liability of serious breakages, while with the electrical set, the operation is perfectly smooth and breakages due to the shock of reversal are eliminated. The time of acceleration of the mill motor from practically zero to full speed is only one and one-half seconds during some of the short passes.

Curves were also shown indicating the efficiency of the Ilgner set taken as a unit, based on approximately 1,200 tons of finished 3½ x 4 in. billets. The input, as shown by one of the curves, being 139,043 kilowatt seconds, this gives a power consumption of 19.81 kw.h. per ton of steel and an average indicated input of 959 kw.h. It is interesting to note how close the above 19.81 kw.h. per ton agrees with data taken from actual operating conditions, which showed a consumption of 19.2 kw.h. per ton. This indicates that the efficiency curve is fairly reliable under the conditions assumed, which conditions are maximum tonnage and minimum size that is possible to be rolled on this mill and fly-wheel set not disconnected from line.



Operators' Pulpit, Electric Rolling Mill

The great advantages of the type of drum controller used, as compared with steam equipment, was pointed out by the speaker. This electrical controller can be operated by a man for a full day without any undue exertion, while with the steam installation, the strain on the operator is such that he can only work for an hour at a time and then lay off for an hour.

Greatly Decreased Costs

Further advantages of the electrical set were illustrated by a cost data sheet thrown on the screen, showing that the power cost in the Steel Company's plant was 36 per cent of the total cost of production, including interest and depreciation, while it was pointed that with steam equipment the power costs would probably reach 80 per cent.

Summing up the advantages of the Ilgner system, the speaker saw them as follows:

Low cost of power.

Low cost for repairs and maintenance.

Stand-by losses nil.

Small time to get under way from complete shutdown to rolling conditions.

Few delays necessary.

Part of rotative energy of mill parts.

Recovery for useful work.

Speed proportional to displacement of controller lever from off-position.

Motor does not race when steel leaves rolls.

Constant turning moment.

Mill breakage less.

Simplifies mill layout.

Small area or ground space needed.

Lends itself to centralization of power.

Ideal load to add to any generating station.

The Electric Propulsion of Ships—Equipment of "New Mexico" Battleship

The possibility of propelling ships by electric motors has for a long time been considered, but it was only after the turbine-generator had attained a high state of development in the matter of efficiency and lightness that any justification for electric propulsion began to be evident.

The most recent attempt at electric ship propulsion is in the case of the New Mexico battleship of the U. S. Navy. This is a 32,000-ton ship and is stated to be the most powerful battleship afloat.

The contract for the electric propelling equipment of the New Mexico included the following machinery:

- Two main turbine-generator units, complete with throttle and governing valves.
- Four main propelling motors.
- Switches, panels, instruments, controllers, cables, insulators, etc., complete.
- Two main motor-driven circulating pumps.
- Two main motor-driven air pumps.
- Two main motor-driven hot-well pumps.
- Four motor-driven lubricating oil pumps.
- Two motor-driven oil coolers and tanks.
- Motor-driven blowers for ventilating the main motors.
- Spare parts for the above apparatus.

The following information covering the electrical equipment is of special interest:

Of the two main turbine-generator units, each generator is designed to develop 10,500 kw. at 78 per cent. power-factor, and 13,500 kv.a. at full speed of the ship, and to carry a 25 per cent. overload (16,850 kv.a. at 78 per cent. power-factor) for four hours. The rotors have two poles and a maximum rotative speed of 2100 r.p.m. which corresponds to a frequency of 35 cycles. The stators are wound two-phase with leads brought out from the beginnings and endings of each phase to an 8-pole, double-throw, disconnecting switch placed in the main circuit between the generators and the motors. By manipulating this switch two generator connections are available: first, diametrical, two-circuit, low-voltage (3000 volts); and, second, square, one-circuit, high-voltage (4240 volts). With a constant flux, the voltage will vary directly or inversely as the $\sqrt{2}$ depending on the connection involved. Suitable interlocks have been installed, making it impossible to operate the two generators in parallel.

All speeds of the ship up to 17 knots inclusive are obtained by the use of one generator having the low-voltage connection, the generator furnishing power for driving the four motors. Above 17 knots, two generators having the high-voltage connection are used, each generator furnishing power for driving two motors. The main turbine-generators are used only for propelling the ship, and are in no way connected to the lighting or other auxiliary power circuits. Therefore, it is possible under the varying conditions of load to adjust the voltage and current to obtain good efficiency.

24 Per Cent. Margin of Power

The generators are conservatively designed. Compared with the maximum rated machines for land practice, the relative armature reaction is considerably lower and the densities in the magnetic section are slightly higher. Sufficient excitation current is applied to the generator fields to insure keeping the motors and generators in step. In other words, the generators are not working at the peak of the kilowatt curve, but at a safe distance down where there is sufficient margin in power to take care of the rudder swings and heavy seas. Based on the maximum power-factor of the motors, 79 per cent., the generators have a margin in power of 24 per cent. with the excitation given.

The induction motors, direct connected to the ship's propeller shafts, are two-speed motor with connections for 24 and 36 poles. The speed reduction between the generators and the motors when using the 24-pole motor connection is 12 to 1, and with the 36-pole connection, 18 to 1. Hence, the extreme range of generator r.p.m. for the specified operating speeds of the ship, 10 to 21 knots is approximately 1440 r.p.m. to 2100 r.p.m.

Since the motors and generators were especially built to operate together, more liberty in design was allowed. A new type of winding was designed, the coils of which were so grouped that a change in the connection at the motor terminals would give a balanced quarter-phase distribution for either 24 or 36 poles. This gives a simpler control than if the motor were wound three-phase. In addition, since the four motors receive power from two generators at full speed and one generator at cruising speed, the best combined operation is obtained with a decreased voltage on the 36-pole combination. This also works out best for a quarter-phase winding; by connecting the generators in square connection for high speed and parallel connection for low speed, the correct ratio of operating voltage is obtained. By this scheme of connection, eight terminals were brought out of the motor though only four-line leads were required.

The specified requirements for driving the New Mexico propellers called for 26,500 h.p. at 161 revolutions per min. corresponding to 21 knots ship speed, and 8350 h.p. at 112 revolutions per min. for cruising at 15 knots.

Type IQ-24 36-7250 2175-175 124KK-4200 3100. V. Motor—Stator and Rotor

The motors were wound to operate with an output of 6700 h.p. at 4000 volts on the 24-pole connection and 2050 h.p. at 2800 volts on the 36-pole connection with an overload capacity of 8375 h.p. at 173 r.p.m.

At speeds from 8 to 15 knots, the four motors are operated on the 36-pole connection from one generator with its winding connected in parallel, the switching being so arranged that either generator can be used. The variation of speed is obtained by steam control on the turbine-generator.

From 15 to 17 knots, the motors are thrown over to the

Type IQ-24/36-7250 2175-175 124-KK-4200 3100 V. Motor—Left, section of Rotor; middle and right, sections of stator

24-pole connection still using one generator only. About 17 knots, two generators are used connected in two squares. The two motors and generator on the starboard side and the two motors and generator on the port side are connected together and each set operated as separate units.

For reversing, the 36-pole connection only is used. If the motor is running on the 36-pole connection one phase is reversed. If operating on 24-poles, the connections are changed over to 36 poles and reversed.

During the trial run a test of this reversal was made with the boat running at a speed of 21.25 knots. At this speed the motors were reversed and the screw was brought up to full-speed astern on the 36-pole connection (two-thirds of the forward speed) in 20 seconds; 12 seconds of this time being used in switching.

Two 300-kw. turbine-gear-driven, direct-current generating sets, arranged for either 120 or 240 volts, supply the excitation and power for the auxiliaries mentioned in the beginning of this article. There are also two motor-driven boosters supplied, one for each generator field. These boosters can either boost or lower the voltage 60 volts; in other words, if the field is connected to the 240-volt circuit the excitation voltage can be varied from 180 to 300 volts, and if on the 120-volt circuit from 60 to 180 volts.

In order to obtain quick reversal, increased field excitation is always used and can be obtained only by pulling the field lever by hand against a heavy spring which brings the excitation back the instant the lever is released. By this arrangement, injurious heating of the field is prevented.

The information given above is taken from a series of articles appearing in the April issue of the General Electric Review, of which advance proofs were kindly forwarded us.

Government Control Through a Commissioner's Eyes

By Charles E. Elmquist[*]

Government control and operation of rail, water and wire lines will probably force the issue of government ownership in the 1920 campaign. This is indicated by the testimony and views of government officials and by the action of organized labor and certain groups of farmers and other interests. If the people decide to continue government control or to purchase the properties, a strong sentiment may be expected to develop for municipal ownership of other public service corporations.

While there is no direct relationship between steam railroads and electric railways, the question of ownership is going to be ultimately determined on principle. Should it be decided to purchase the steam railroad and wire systems, there is no escape from the conclusion that public sentiment will also demand the purchase and operation by the people of street cars and other utilities in a great many places.

In a local sense this sentiment will be augmented by the conditions which now confront the electric railway lines. The increased operating costs have forced many companies, and the nickel fare has become the exception rather than the rule. But every rate increase takes from the customer something which was given to him by contract or by order of a commission, and he is likely to feel that he has been deprived of his just rights.

Hence in the near future one may expect an insistent demand for the reduction of fares, tolls and charges. Petitions will be filed with the proper authorities challenging the reasonableness of the higher rate. In all such cases the commissions or courts must be governed by the facts presented, because there is nothing more certain than the regulation of rates must be controlled by facts and operating ratios of utilities will decrease, but it is more than likely that adjustments will not be sufficiently rapid to satisfy the public demand for reduced rates.

During this period the pathway of regulating officials will not be strewn with roses. If the facts will not permit a reasonable reduction of rates, an agitation for municipal ownership of these plans can be expected. The people will feel that by possession alone can they secure the rates which in many instances were agreed to as a condition precedent to the occupancy of the streets.

These preliminary observations lead me to the following conclusions:

Municipal Ownership

Immediate attention must be given to the question of municipal ownership. Facts for and against should be compiled and distributed so that the people may have a chance to decide the question upon its merits. The only known preventive is a satisfied public. Efficient service, reasonable rates, courteous treatment of patrons and justice to employees as well as to investors should characterize the conduct of these utilities. No company can successfully defend itself against a hostile public.

National Co-operation

While electric railways are local and perform a service which is largely local, yet their interests are identical in that most of them are confronted with the same kinds of difficulties. It might be profitable for the national organization to continue a study of all questions dealing with improvements and economies in service and to make suitable recommendations to the local companies.

Reforms mannot be made in a month or a year, but if all the managers take hold of the problem in a broad way and endeavor to follow the recommendations of a central body, they will be able to accomplish much to the mutual interests of themselves and the public.

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[*] President National Association of Railway and Utilities Commissioners. Address before American Electric Railway Association.

Uniform Rate Procedure

Rate adjustments should be, and as a matter of fact are, largely questions of facts. They involve consideration affecting the revenues and expenses, competition, prospective earnings, investment and value. The controlling principles should be the same everywhere in this country. In the consideration of petitions for reduced rates, the courts and regulating tribunals are entitled to have the questions fairly, honestly and intelligently presented. The same theory of defense should be presented in California and Maine, Illinois and Texas.

A large saving could be made of the time, labor and expense of these utilities, as well as of courts and commissions, if a substantially uniform method could be adopted for the presentation of rate questions. It would seem that such a plan could be successfully worked out by a committee representing the American Electric Railway Association.

Corporations try their cases before courts with great skill and ability, but unfortunately it is a too common practice for them to appear before commissions without proper preparation. Times without number, representatives of the carriers have appeared before the Minnesota commission to favor or oppose a petition, without having agreed upon a course of action, and with no one there prepared to offer an intelligent statement. Each carrier, when called upon, would re-state the opinion of the first speaker. Frequently their cause was just, but it had to be denied because there was no evidence. This practice is not local to Minnesota.

The purpose of a public warning is to give a fair trial, at which time evidence may be offered by both sides. Hearings would result in a farce if real consideration were not to be given to the evidence in the case. Commissions are busy, and their burdens would be greatly relieved if corporations presented cases in a clear-cut manner. They should give facts instead of opinions, and always bear in mind that public servants are watched and that an order made in a litigated case, which is not supported by evidence, is arbitrary and illegal and subjects the commission as well as the corporation to serious criticism, and that such proceedings are likely to result in unfriendly legislation.

Accounting Uniformity

Considerable progress has been made in an effort to establish a uniform accounting system for utilities. It is not always easy to harmonize the conflicting ideas of the accountants who represent the states and the federal government, and this problem is made even more difficult because the views of utility representatives should also be considered. Uniformity is desirable, and every effort should be made to bring it about.

Of course, there may be local conditions necessitating the compiling of special or additional information. As president of the National Association of Railway and Utilities Commissioners, I shall urge the committee on accounting to give special consideration to this matter, and I earnestly hope that real progress may be made during the year. May we not look for co-operation from a committee appointed by the American Electric Railway Association ?

Definite Valuation Plan

Public ownership involves the purchase of the utilities. This is brought about by agreement or condemnation. In view of the prominence which is to be given to the question of municipal ownership, the utilities should not be guilty of "watchful waiting." Preparations should be made for the day when the properties may be taken over. The people should not pay more than the properties are worth, and it is difficult to determine the price in the absence of a physical valuation.

The principles of valuation are not definitely settled. Unfortunately, there are as many different ideas upon this subject as there are lawyers and engineers who make a study of it. Hence it is important that the American Electric Railway Association investigate the problem through a proper committee, authorized to formulate rules and suggestions for the guidance of the companies. A definite plan would be exceedingly helpful to the public as well as the corporations, and it might result in an early judicial determination of the correct principles of valuation for use in purchase, rate-making, taxation and capitalization proceedings. I strongly urge that conservative action be taken by this committee. In the last analysis, nothing is to be gained by claiming everything of present or prospective profit, elements both tangible and intangible, visible and invisible, in the heavens above or the earth beneath.

The steam carriers believed there was advantage in united action. When the government began the valuation, the steam railroads appointed a conference committee, which selected able lawyers, engineers and accountants who were to devote their attention exclusively to this work. This committee brought to the attention of the Interstate Commerce Commission all the law upon the subject, and it compiled a mass of statistical data and expert opinions which greatly aided the commission to arrive at its conclusions in the early valuation cases.

Valuation will play a more important part in rate cases than it has in the past. We seem to have drifted away from the anchorage of contract fares. Rates should be determined by facts rather than by negotiation or compulsion. The public suspects that there is over-capitalization in many of the electric plants. This suspicion will not be allayed until the people know what these plants are really worth.

If the securities are excessive, they should be written down to the basis of the real value of the properties used in the public service. In connection with this subject, it will not do to overlook the fact that original cost is an important element to be considered in arriving at value, and that commissioners are insisting that this item be shown.

Indeterminate Franchises

The experience during the war will result in a greater assertion of authority by the states over the rates of electric railways than heretofore. The rapid increase in the cost of wages, fuel and supplies brought the public face to face with the fact that public service cannot be efficiently rendered by a company which pays out more money than it takes in.

Fixed rates and flexible costs are inconsistent. Every student realizes that both elements must be variable in order to meet changing conditions, and that the determination of the rate to be charged should be made by a body of expert men. Courts no longer attribute sacredness to a franchise rate. The doctrine that a state may fix a reasonable rate for a local utility unless restricted by constitutional limitations has become the accepted law.

We have entered upon a new era in the regulation of local utilities. At this time emphasis should be given to the importance of transferring to the state authorities the ultimate determination of rates, subject of course to an appeal to the courts. The fairest way to meet necessary changes in conditions and to secure for the public, as well as the corporations, that enlightened consideration to which all are entitled, is for the state to issue indeterminate permits in lieu of existing local franchises.

It is not necessary to discuss the merits of this plan. It has been tried out in several jurisdictions and found to be acceptable. The advantages to the companies, the investors and the public are many; the objections, few. Tested by experience and the judgment of earnest and competent men, it seems to come nearer meeting the requirements than any other plan that has been suggested.

But this presents a legislative question, and laws must be passed to suit the needs of a particular state. The American Electric Railway Association should arrange to have prepared an article fully setting forth all of the advantages and the disadvantages of the indeterminate plan. Then all interested parties could have the benefit of the best arguments on both sides of the question.

The extent of state control depends entirely upon local conditions. I have found that state commissions do not relish the idea of exclusive control of street car companies by the state. Many of them believe that the municipalities should retain their powers over these utilities, subject, however, to an appeal to the state commissions. This is not a denial of the right of home rule. It substitutes a board of experienced men for a court in passing upon disputes between utilities and municipalities.

Sliding Scale of Return with Combined Services

The Electric Railway Journal prints the following report of the work of the Commission appointed to investigate the affairs of the New Brunswick Power Company, St. John, N.B.: The Company is at present concerned in a very interesting proposal in connection with utility regulation. An investigating commission has proposed resettlement which provides a most striking combination of the service-at-cost principle with a sliding scale of return on investment, based on combined rates for railway, electric and gas service.

In 1918 the Lieutenant-Governor in Council was empowered by the Legislative Assembly of New Brunswick to appoint a commission to examine the condition of the company and make recommendations in connection therewith. The members appointed were Guy W. Currier, chairman; Henry Holgate and Prof. Albert S. Richey. This commission has now reported certain recommendations which it is believed will be of interest to electric railway operators.

It is recommended that the control of operation, maintenance, service and rates be vested in a board of seven directors, four elected by the company and three appointed by the Lieutenant-Governor in Council for three-year terms at annual salaries of not more than $1,000. Moreover, it is said that an experienced public accountant should be chosen annually by the public directors, with the approval of the company directors, to report semi-annually on financial operations.

The commissioners are of the opinion that no special taxes of any kind should be assessed against the company, which should be required to pay only such property, income and other taxes as are paid by other general corporations in the province. The company should not be required to pay for any street or road repairs, except those made necessary by the maintenance, renewal or construction of its own way and structures, or for the removal of snow from any street or road or for any part of the cost of construction of new pavement or change in the pavement. The company should not be required to pay rental for the use of any street or bridge beyond the expense of maintenance of tracks. The reason given is that such tax payments would be reflected in the cost of service and thus result in higher rates.

The board of directors would fix from time to time such rates for railway, electricity and gas services as would meet but not exceed the cost of service, which should include operating expense, taxes, maintenance, depreciation allowance, return on investment, and any other expenditures properly chargeable against income. An annual allowance of $75,000 should be set aside out of earnings for depreciation (to be increased as the investment increased) until the fund amounted to at least $200,000 and in no case less than 7 per cent. of the rate base, after which time such an amount should be added annually as would keep the fund intact at this sum. The directors should charge to the annual cost of service, as a return on the rate base of January 1, 1919, 7 per cent. of such base, plus or minus additional percentages according to the fares and service charges in force.

Rate of Return to Be Between 6 and 9 Per Cent.

At the time of the semi-annual audit, the accountant should determine the average fare received per passenger, the average rate per kilowatt-hour and the average rate per thousand feet of gas, and calculate such average rates as percentages of similarly calculated average rates during the six-month period from January 1 to June 30, 1919. By giving due weight to these three percentages, based on the proportionate amount of gross revenue received from the different services, he should then calculate the weighted average percentage by which the rates during the preceding six months had been increased or reduced compared to those in effect during the period from January 1 to June 30, 1919.

The theoretical rate of return on the rate base for the following six-month period should then be 7 per cent. plus one-tenth of 1 per cent. for each 1 per cent. by which such weighted average rate for service had been so reduced. Similarly, the theoretical rate of return should be 7 per cent. minus one-tenth of 1 per cent. for each 1 per cent. by which such weighted average rate had been so increased. The actual rate of return, however, should be not less than 6 per cent. or greater than 9 per cent., notwithstanding the fact that the theoretical rate of return might be greater than 9 or less than 6 per cent.

The commissioners recommended that legislation providing for the above features be passed and that the acceptance of the new legislation shall be made to constitute an agreement on the part of the company to sell at any time to the province or any of its political subdivisions all the property included in the rate fare for cash equal to the rate base as then determined plus 10 per cent. and any premium required to retire bonds. The company should then be protected from competition on the part of private or municipal plants.

Motormen and conductors on the Winnipeg Electric Railway, who are now drawing 39 to 47 cents an hour, have put in a demand for an increase to 60 to 70 cents an hour, together with a straight rate of $25 a week for extra men. These demands are made on the basis of an eight-hour day, and would involve the expenditure of an additional $750,000 a year by the company. It is understood that, before giving an answer, the company will endeavor to secure an increase in fares.

Municipalities in the counties of Huron and Bruce recently sent a delegation to Toronto to wait upon the Hydro-electric Power Commission of Ontario asking that several districts be supplied as soon as possible with Hydro power. The following blocks are asked for: Wingham, 500 h.p.; Teeswater, 100 h.p.; Blyth, 150 h.p.; Lucknow, 100 h.p.; Ripley, 75 h.p.; Kincardine, 250 h.p.; Port Elgin, 300 h.p.; Fordwich, 50 h.p.; Gorrie, 50 h.p.; Brussels, 100 h.p.; Paisley, 100 h.p., and Southampton an amount undecided. The Hydro Commission will proceed with estimates.

Twin City Rapid Transit Company Installing Coasting Recorders

An interesting experiment is being tried out by the Twin City Rapid Transit Company in the purchase of some 1,100 Rico coasting recorders. The results to April 1 of this year are given in the latest issue of the Electric Railway Journal.

Coasting Saves Power in Twin Cities

As of June 15, 1918, the Twin City Rapid Transit Company had already installed 340 out of the 1,100 Rico coasting recorders purchased to outfit its system completely. Other lines are in process of being equipped and while the installation is still not complete the company is well pleased with the results obtained.

Records were taken from the time the first recorders were put out, but the first comparative statement for the information of the men was not issued until April 1. This was accompanied by a bulletin from General Superintendent Caufield, who explained why men on the extra list would be grouped by themselves for the sake of fairness. Mr. Caufield also pointed out that a man's costing record was in direct proportion to the amount of his willingness and earnestness to "Save and Serve."

At the very beginning of the year 1918 the company issued to the trainmen a booklet entitled "Doing Our Bit—Coasting and Its Relation to the War." At the opening was this quotation from Bulletin 183 of the United States Fuel Administration: "An investigation convinces us that electric railways offer a chance for large savings." The relationship between coasting and fuel saving was succinctly portrayed thus:

MORE COASTING → LESS POWER
LESS POWER → LESS COAL

An informal coasting campaign had indicated to the company that with the co-operation of the trainmen the total amount of coasting then being done could be increased by not less than 10 to 15 per cent. This estimate, as will appear later, already was very greatly exceeded—a compliment to the management, the men and the coasting recorder.

The remainder of the pamphlet gave the men good suggestions on how to operate more efficiently through increased coasting and how to key the coasting recorder and turn in the printed record therefrom. The conclusion said: "The more you coast, the more coal you will save, the easier will be your work, the less will be the wear and tear on the car equipment, and the safer and more comfortable will be the ride of passengers, the customers who pay your wages.

"In the interest of safety and economy, and on behalf of the nation at large, the management asks the hearty cooperation of each trainman toward the successful carrying out of this campaign."

That the men responded heartily from the start to this appeal to save power is clear from the following results secured during the first half of last year:

Coasting Percentages on Twin City Lines Out of Nicollet Station

	January	May	June
Marquette and Grand	25.6	31.2	30.2
Fourth Avenue South and Sixth Avenue North ..	21.5	25.7	24 9
Monroe and Bryant	22.0	28.7	28.1
Fifty-fourth and Columbia Heights	22.2	27.8	26.8
Extra list	23.9	25.5	25.4

It is hardly necessary to point out that from the very beginning the men showed a big advance over the ordinary unchecked motorman. The slight drop in June did not indicate a decrease in efficiency, because some of the lines were speeded up at the same time that increased the number of stops per mile. Nor is any attempt being made to drive the men. The management is satisfied that if the men are thoroughly imbued with the importance of coasting they will continue to improve steadily and permanently. It is much more to the point to have a good general average than a few very high ones and a mass of low ones.

On the basis of only 30 per cent. equipment of the Twin City lines with coasting recorders, Chief Engineer Scofield found an energy saving of 5 per cent. for the whole system, which would indicate a saving of at least 16 to 17 per cent. for complete installation. Mr. Scofield has kept careful records of energy consumption per car-mile over many years. With due allowance for weather and temperature conditions, the saving can be accounted for only through the correct use of the coasting recorders.

Riviere du Loup Extending Plant

The city of Riviere du Loup, P.Q., has given out contracts for power house equipment for improving and extending the existing lighting and power system. The plans were drawn by Mr. J. Allyre Roy, C. E., of Montreal. At present there is a small plant located in a power house at the foot of the Riviere du Loup Falls, situated in the centre of the city and owned by the municipality. The falls are capable of developing 1,500 h.p. at the minimum flow. The plans provide for the conversion of the existing system from two phase to three phase, and the extension of the system to St. Patrick, an outside municipality; another outside municipality, Cacouna, will also be supplied by the system. At present the street and house lighting are on the same circuit, but under the new plans there will be separate circuits. Provision is also made for future extensions. About 250 h.p. is now developed with an old type turbine. This will be replaced by a new water wheel, working under a 98 ft. head, supplied by the S. Morgan Smith Co., York, Pa. It is of the horizontal type, 525 h.p., 600 r.p.m., direct connected to the generator. This will allow of the development of power to the full capacity of the penstock already constructed. The Canadian Westinghouse Company have secured the contract for the 400 kw., 60 cycle, 3 phase, 2200 volt, 600 r.p.m. generator, belt-driven exciter, three regulating transformers, switchboards, etc.

Saskatchewan May Have One-Man Cars

In the Province of Saskatchewan, up to the present session, the law has made it impossible to operate street cars except in charge and under control of at least two competent men, a motorman and a conductor. It has thus been impossible to introduce one-man cars. The operation of such cars, however, has been so successful in other places on this continent that an amendment to the law has been agitated for the last three or four years and during the last session, the Saskatchewan Legislature has amended this Act to such an extent as to make it possible to operate one-man cars at the option of any city or town.

A by-law will be submitted in the near future asking authority to commence work on a high tension transmission line connecting Winnipeg with Portage la Prairie, Man. This scheme has been talked about for several years and it is now believed that plans will be ready to commence the work within the next two or three months. It is suggested that construction shall be carried on by the electrical departments of the two cities, using day labor. The estimated cost of the work is placed at $350,000.

Henry Ford is said to be working on plans for a street car to be driven by an internal combustion engine and which will be demonstrated in Detroit this summer.

The Contractor-Dealer

Joint Industrial Council of Building Trades Formed in Toronto with Representation from Toronto Section of the Ontario Electrical Contractors' and Dealers' Ass'n

Following a considerable amount of preliminary work, a Joint Industrial Council of the Toronto Building Trades has been appointed to deal with problems and points at issue between employers and employees. The council consists of ten members, five representing employers and five representing employees. Mr. Geo. Kay, of the Bennett & Wright Co., is the representative of the Toronto Section of the Ontario Association of Electrical Contractors & Dealers.

Below we print the draft of the proposed constitution which, we understand, has been agreed upon, subject to any changes that may be found necessary as the work of the Council proceeds. The plan follows pretty closely the well-known Whitley plan, which has taken such a hold in England:

1. Name

This council will be known as the Joint Industrial Council of the Toronto Building Trades.

2. Aims and Object

To harmonize and standardize the conditions of contracting and employment in the Toronto building trades, and to secure the largest possible measure of joint action between employers and employees, for the development of industry as a part of national life and for the improvement of the conditions of all engaged in that industry.

3. Membership

The council shall consist of ten (10) members, with power to add to their numbers. Representatives shall be as follows:

Two from Builders' Exchange.
One from Ontario Association of Electrical Contractors and Dealers.
One from the Toronto Society, Domestic, Sanitary and Heating Engineers.
One from International Master Painters' Association.
Five from Building Trades' League.

4. How Elected

Representatives shall be duly elected by their respective bodies (see clause three) and it is further provided that it shall be optional for both parties to elect alternatives.

5. Chairman and Vice-Chairmen

The chairman shall be a co-opt. member; he shall be a disinterested person, and shall be elected by a majority of the council. There shall also be two (2) vice-chairmen, one to be chosen by the employers and one by the employees.

6. Secretary-Treasurer

The council shall be empowered to maintain a secretary-treasurer and such other clerical staff as it may think fit.

7. Term of Office

The representatives to the council shall retire annually, and shall be eligible for re-appointment by their respective bodies. Casual vacancies shall be filled by the association concerned, which shall appoint a member to sit until the end of the current year.

8. Committees

The Joint Council may appoint committees from time to time, as may be deemed advisable, and such committees shall report back all matters referred to them for confirmation, unless otherwise determined by the Joint Council.

9. Co-Opt. Members

The council shall have the power of appointing on committees, or allowing committees to co-opt. such persons of special knowledge, not being members of the council, as may serve the special purposes of the council.

(a) The two associations in the council shall be equally represented on all committees, and (b) any appointed co-opt. members shall serve in consultation capacity only.

10. Duty of Officers

(a) The chairman shall preside at all meetings of the Joint Industrial Council, and all committee meetings, and shall perform such other duties as are usual for such an officer, provided, however, he shall have no voting powers.

(b) The vice-chairmen shall, in order, perform the duties of the chairman, in the advent of his temporary disability, or his absence from meetings. They shall have voting powers by virtue of their membership in the Joint Industrial Council.

(c) The secretary-treasurer shall keep a record of the proceedings of all meetings of the Joint Council, receive all moneys, and render a correct statement of same, at each general meeting of the council. He shall perform such other duties as appertain to his office.

11. Meetings

(a) The meetings of the Joint Council shall be held as often as necessary.

(b) The regular meetings of the Joint Council will be held on the first (1st) Monday of each month at 2 p.m., in the office of the Dominion Government Fair Wages Officer, or such other places as may be determined by the Joint Council from time to time.

(c) A special meeting of the Joint Council shall be called by the chairman within two (2) days of the receipt of a requisition from any of the constituent associations. The matter or matters to be discussed at such meetings, shall be slated upon the notice, calling the meetings.

12. Voting

The voting, both in council and in committees, shall be by show of hands or otherwise, as council may determine. No resolution shall be regarded as carried unless it has been approved by a majority of those present on each side of the council.

13. Quorum

The quorum shall be three (3) members on each side of the council.

14. Finance

The expenses of the council shall be met by the Employe[illegible] Association and the Building Trades' League, in equal proportion.

15. How Amended

This constitution may be amended by a majority vote of all the duly elected employee representatives, together with a majority vote of all the employer representativs. Amendments must be proposed in writing at a regular meeting, and no vote shall be taken thereon until the regular meeting following such presentation. No amendment shall be adopted that will destroy or limit the equal voting power of the employee representative and employer representative in the Joint Council.

16. Order of Business

(1) Roll Call.
(2) Reading the minutes of the preceding meeting.
(3) Business arising out of the minutes.
(4) Secretary-treasurer's report.
(5) Communications and accounts.
(6) Deferred or unfinished business.
(7) New business.
(8) Good of the council.
(9) Adjournment.

Merchandising!

Mr. Corcoran Tells Large Gathering of Toronto, Hamilton and London Contractors and Dealers, and C.G.E. Sales Agents How To Do It—Outline of a Vigorous Selling Campaign

The regular monthly meeting of the Toronto section of the Ontario Association of Electrical Contractors and Dealers was held in the King Edward Hotel on the evening of April 3rd. It happened that this meeting coincided with a convention of Canadian General Electric sales agents throughout the Dominion who met in Toronto during that week and so a joint meeting was arranged. The primary cause of the joint meeting was an address on "Merchandising" delivered by Mr. Corcoran of the Commercial Service Department of the General Electric. Some two hundred were in attendance and the address was at the same time one of the most interesting and helpful that has been delivered before the contractors' association:

The speaker was introduced by Mr. Kenneth A. McIntyre, the president of the association, who mentioned that Mr. Corcoran happened to be a close friend of Mr. Goodwin's, a fact which would certainly not lessen the warmth of the welcome accorded him by Toronto electrical men.

Mr. Corcoran said it had been his fortune to work on sales campaigns for the General Electric Co. for a number of years and Mr. Goodwin had finally arranged for him to make a special study of retail merchandising. It was his object to talk on the phase of retail merchandising that deals with store sales. He had a series of charts which embodied statistics in a more than usually interesting form, but had been unable to bring them with him. However, he would give some of the figures from memory. "There are," he said, "in the United States 20,689,000 families, and 5,500,000 of these families are served by electricity, but these 5,500,000 families, according to latest information, are using only about 9,000,000 electrical appliances."

Getting down to the actual problems of merchandising, Mr. Corcoran proceeded: "There are a great many things that bear on the subject of retail merchandising—cost, stock insurance, and so on, but to my mind the fundamental thing is selling. The retail electrical merchandising business, as far as the sales are concerned, depends upon the contact with the public. It is very important to know what these points of contact are. Reducing them to an even five, there is, in the first place, the exterior; next, the interior; next, publications; then, newspaper advertising, and, last, but not least, window display. In my talk tonight, I wish to emphasize window display, for, in analyzing the retail business, I believe the greatest asset of the contractor-dealer is his windows.

"However, the first point is store exterior. Location is, of course, fundamental. The better the location, the more people see it and the stronger is the contact with the public. In the second place, there is the store appearance. Has it a good appearance, or the appeal negative? The next point is the attitude of the employees. Are the men who are sent around to do your work courteous, neat and efficient?

"Then there is the store interior. The arrangement is very important, as well as the general appearance and trim. The employees also are, of course, a very big factor. Are they courteous? Do they suggest other sales? You probably all have heard the story of the president of the United Cigar Stores, who, on one occasion, sent out a telegram to every store in the firm's system asking, 'Did you say thank you to everybody you did business with today?'

"Next is the publications; here is another very important point of contact with the public. Every single manufacturer of electrical goods in Canada has these publications available for use, but do you use them? And then, there is newspaper advertising. Retail practice has shown that from 3 to 5 per cent of total business is usually well spent on advertising, but the advertising must be timely, attention-drawing, pertinent, to the point, and you must use good space. It is not necessary to do too much advertising on any one line. An overdose of any good thing will kill a man, or at least make him giddy.

You Are Selling "Service"

"For the benefit of the salesmen present, do you ever realize that you are not selling goods but the service the goods are intended for. A certain article is made to perform a certain service—a motor is made to move, and the purchaser wants it because it will run. The dealer, however, does not buy it primarily because it will run. He buys it because it will sell. Of course, the sales value depends on its characteristics. The manufacturer puts into that article a certain amount of an intangible something we may call "sales power." He builds that up by means of advertising. If the article is advertised to a great extent so that it almost sells itself, it has 100 per cent. sales power. The full sales power of any device, however, cannot be realized unless the contractor-dealer will help. In other words, he has got to do retail electrical merchandising. There are five different motives which influence the purchaser; foresight, saving, pride, comfort and utility. Every advertisement must appeal to some of these buying motives. It must have interest, creating attention, then desire, and, finally, action. If you remember these points, I believe you have the fundamentals of applied retail merchandising."

The speaker then proceeded to point out the value and importance of window displays. He believed it was not fully realized, and instanced many cases in which the results obtained from attractive and timely displays were nothing short of astonishing. One customer of his firm, he said, telephoned him last summer, complaining that electric fans were not selling rapidly in the contractor-dealers' stores, while on dropping into the department stores he found they were selling like hot cakes. The speaker himself had been in New York the week before and had found that the department stores had their show windows full of fans, while over 90 per cent of the electrical contractors hadn't a fan in their windows at all. So he told his complainant that what was needed was to have the contractor-dealers display the fans. Sometimes the contractors talked about competition by other stores, but in New York city, there were just two department stores showing fans, while there were over 1,500 contractors in the city. What chance would the department stores have had if the contractor-dealers had displayed the fans in their windows. That is one point of contact that it costs nothing to use and which is most effective.

What One Display Did

Another instance, the speaker gave, was where he had asked one of their men, making laboratory merchandising experiments in Troy, N. Y., to have a fan window display put in a store in that city. He put the display in on Monday and on Thursday had to take it out, having sold all the fans in stock except three. All the other contractors in the city reported the fan sales poor for the season. This man attributed the quantity of business done to the fact that he had fans in the window from the beginning of the season and that he had synchronized his display with the hot weather.

On one occasion, as an experiment, he had taken one of the worst-selling articles in the firm's stocks—a specialty which had been gotten out some years previously and which had really only been left in their catalog by mistake—and had worked this up in a window display in a dealer's store. The dealer said he had bought about ten of these articles ten years before and he thought he had them all in stock yet. However, he put in the window display and not only sold all there were in stock but also a number of others. This went to show that goods could be sold if put in the window.

Another rather humorous instance was cited, where a small dealer in Schenectady, who had bought his first electric washing machine and was rather proud of it, asked to have a window display made with it. The window was put in on Friday and the man came back on Saturday with a sad story. "I'm in trouble again," he said. "Just as soon as I finished that window display and was nailing up the show card, there was a fellow watching me and he came in and asked me about it and I had to sell it to him."

Following his address, Mr. Corcoran had an interesting film thrown on the screen, entitled "'A trip to the Pittsfield Works," which showed in detail the manufacture of the company's fans in their plant.

Afterwards the speaker gave details of a fan campaign which has been worked up for the coming season by the General Electric Co. This, he said, contained all the essential features for successful retail merchandising except those that must be featured by the co-operation of the contractor-dealer. The company had gone as far as it was possible for a manufacturer to go.

He displayed the complete 1919 One Hundred Per Cent Fan Campaign material. This is what is given to every contractor-dealer who signs a G.E. fan contract. The company has taken as the corner stone of the campaign the slogan, "G. E. Fans refreshing as a summer shower." To carry out this idea, a rainbow has been designed to be placed on the inside of the glass of the contractor-dealer's window, making a very conspicuous display. It has been considered bad advertising to paste anything on the glass, but in this particular instance, this procedure is excusable because the real attention-getter is not obscured. The usual practice has been to paste a display on the glass, while the inside is filled with unattractive cartons, but in the G.E. display the interest is inside the window.

Another feature of the display is a color wheel which is attached to the fan motor, replacing the blades. The idea of a color wheel is not new, but its application to a fan is unique.

As a further corner stone of the campaign, a poster has been designed, entitled "Refreshing Draughts," which emphasizes the effects of G. E. fans. Quite unintentionally, the speaker assured his hearers, this was appearing in an advertisement in American magazines on July 1st.

Dealer Helps

To back up the dealers' advertising the company conducts an extensive national advertising campaign, using as the key-note this advertisement, "Refreshing Draughts," which is to appear in nearly all of the national magazines.

The contractor-dealer is also supplied with a portfolio entitled "The dealer's one hundred per cent. G. E. fan campaign." besides folders for homes, post-cards for homes, folders for offices, and so on. They are also furnished with different books explaining how the dealer can reach and get in contact with the buying public. One book is entitled "How to sell 100 per cent. more electric fans." On the inside of the cover are 100 ways in which G. E. fans can be sold. The idea of using the "One hundred per cent." in the title of the campaign is that the company manufacture 100 per cent. more fans than in 1918, the dealers buy 100 per cent. more fans and sell 100 per cent. more.

The booklet contains the complete plan of campaign. It also shows picture of theatres, homes, offices, etc., in which the G. E. fan may be used and gives a list of the different places which are prospective customers. When the dealer reads this he begins to realize that there are tremendous possibilities in the buusiness. A chart is included indicating how the field may be reached.

There is also a Mail Campaign Book for G. E. fan dealers, which gives the necessary instructions for conducting a mail campaign—how to get mailing lists, the different publications available for reaching the different classes of trade, etc., and a letter is furnished, varied to suit homes, theatres, restaurants, hotels, stores, general offices, etc., also a return card for every letter the dealer sends. It has been proven that the use of a return card increases replies by 12 per cent. cent.

Instructions are given on window display, with general suggestions as to how to trim. The display, including the rainbow fans and cutouts, is fully explained, and also trims that the dealer can readily put in. Window show cards are also furnished.

Here the speaker drew attention to double page spreads which would be featured in the Saturday Evening Post and Collier's. In the fan book, he pointed out, there were different suggestions for merchandising, also a list of special uses of the fan, such as ventilating sick rooms, ventilating kitchens, drying varnish, keeping frost off store windows. In the end of the summer people who required fans might be tempted to postpone buying till the next season, but they might be induced to purchase by pointing out the value of the fan in heat distribution if turned upon the radiator or set to pull the heat out of a hot air register.

There is also the G. E. sales sales calendar. The company has taken the one hundred fan sale days and divided these into three parts: the preliminary work, the intensive effort and the clean-up. On April 14 commence your campaign by reading your plan carefully; April 18, lay out newspaper campaign; and so on till April 30—then a hint, "Are you in the habit of mailing advertising matter with your monthly statements?" June 11, feature Saturday Evening Post two-page spread to-day. By thus taking advantage of the company's campaign, the dealer gets a cumulative force of advertising. On August 11, the instructions are: Show winter uses of fans. Spaces are left for memoranda, so that the dealer can lay out his whole campaign in advance and thereby reap the full value of the seeds which are being sown by the national advertising. Thirty million magazine readers, it was stated, would see the G. E. fan advertising.

On the G. E. boxes last year the ordinary old-style label was used, but this year they have standardized on an attractive label colored blue and orange. Instead of the common corrugated carton, they now have a very pretty carton which would look well in window displays.

The speaker said that the G. E. Company had tried to make their campaign so complete and so flexible that it would reach every class of customer. In conclusion, he read extracts from one of their folders, entitled "Rules for Office Boys," which very humorously suggests ways in which the office boy may save himself work by making sure that the fan is not in operation.

A hearty vote of thanks brought the evening's proceedings to a close.

Selling by Telephone

Put Your Telephone on Your Sales Staff, Too—Possibilities for Much Good Pioneer Work

No person with anything to sell can afford to overlook the "telephone" as a selling agency. It saves an infinite number of useless calls when the prospect is not in or is too busy to talk to visitors. As a means of clinching business it cannot, perhaps, be classed with personal calls, but as opening the way to appointments for talking matters over it surely has no equal. There are few cases where a tactful manner and a pleasant voice cannot interest the person at the other end sufficiently to induce him or her to make an appointment to talk things over and in the interval it is pretty certain that the matter will be given some thought by the prospect. Following this lead the Society for Electrical Development have prepared a number of suggestions which are bound to be helpful in securing orders, if intelligently carried out.

How to Promote Business by Telephone

Central stations, electrical dealers and contractors having something to sell—either service, or merchandise, or both—should not overlook the value of the telephone in promoting their business. There are times when personal visits of the sales force are impractical, or impossible, times when the mails cannot be counted on to get results. That is the time to try the telephone. In fact, one dealer epitomized it this way: "when in doubt—telephone." The ideas outlined herein may not fit every man's business like a glove, but certain principles laid down can be put to work to boost any business.

Ways to Use the Telephone

The telephone can be used in a variety of ways. It can be utilized (1) to secure and classify prospects, to prepare mailing lists, (2) to interest prospects, to follow them up, win attendance at demonstrations, exhibits, displays and to pave the way for the salesman's call, (3) to develop more business from old customers, (4) to secure actual orders for merchandise, (5) to facilitate collections, (6) to adjust complaints and render service to customers.

Before any man decides to use his telephone in any of the above respects, he should first work out his plan of action, decide just what he wishes to accomplish, so far as possible analyze his field, and his ability to wage a telephone attack, and decide how he will follow up the work done by the telephone.

The first thing is to secure the services of a competent operator. In telephone selling, or solicitation for demonstrations and so on, a woman makes a better operator than a man—and a mature, experienced woman is better than a young girl. She should have, so far as possible, the instincts and training of a salesperson, and by all means must have a suitable, well modulated, clear, pleasant voice.

In planning to use the telephone it is well to start by recognizing that what is said over the wire should be as carefully prepared as any printed advertisement. The telephone approach is more often an advertisement that is spoken rather than written. It is just as important to be careful what is said and how it is said. Usually it is best to equip the operator with an outline of a good average monologue which she can memorize easily, and also to furnish her a few sentences that may help her meet the objections of the prospect. It is advisable that this monologue be spoken not in a matter-of-fact, sing-song voice, as though she were reciting a piece, but that she put into it all the qualities that would make it a personal message. In the talk, the more she can do to make the person at the other end of the line feel that she and the company she represents have a personal interest in the prospect's welfare, the better. It is, of course, impossible to write down all the possible objections that the party to be interested may advance, but as readily as the campaign develops, the operator can jot down the usual objections, and short, concise answers can be prepared to guide her.

In the main, of course, the less the operator has to memorize, and the fewer set forms of speech she has to refer to, the better for the success of the campaign.

To Secure and Classify Prospects

Good prospects and customer lists are necessary to every sales campaign. The central station customer list is the "last word" in this connection but this is not always available. It will be found that where this cannot be had, the telephone directory is a good substitute, as over 80 per cent of telephone subscribers have electricity in their homes. Of course, in the case of a house-wiring campaign, for example, special lists have to be made up, and this can be done by referring to the directories, and by getting in touch with tax commissions, real estate boards and so on.

A contractor who did nothing but contract work in a large city had to keep himself before all his possible prospects, about a thousand in all. He had the firm names, but required the names of the individuals to whom he could send his advertising. He employed a girl to phone each company name and try to get the name of the right man. She was only partly successful, and he had to finish the job himself. Until he made clear just why he wanted the name of the man, and assured the prospect it was to their interest to furnish such names, he made little headway. It cost him over five cents a call, plus his time, to get this list, but he figures that it prevented the waste of hundreds of dollars worth of literature.

To Interest and Follow-Up Prospects

Having planned your campaign, outlined the telephone approach, and decided just how the salesmen and demonstrators will use the telephone, as well as the operator in the office (so that there may be no conflict of calls) you are ready to go ahead. Let us take a case where the operator's job is to pave the way for the salesman's visit, working the residential section to sell an electrical washer or cleaner. In this case the operator telephones prospects in a certain district in advance of the man, who at intervals gets from her a report on the people she's talked to in that locality. She may explain to Mrs. Housewife that their man is going to be in the vicinity that afternoon, and "would she permit the man to drop in and show her the new, wonderful Blank washer or cleaner? If the telephone appeal is at all good, she will secure the following results: a certain number of affirmatives where the salesman may call at a specified hour; some where the prospect will agree to visit the store at a certain time; others who will agree to see the salesman, or to come in at some future date, and lastly a certain percentage who will profess indifference and must be thrown out. A certain number of failures, or "let downs" must be expected. The better the telephone solicitation the better the results, the more calls for the salesman or demonstrator—the easier he can sell. Some dealers make it a point to have their salesmen call on prospects who show indifference anyway, merely stating to the housewife that they know she said she wasn't interested, but they felt she had not forgotten the idea in her mind, that if she'd give them just three minutes they could convince her to the contrary.

The telephone should be used judiciously for following up prospects, after the man has called. Many dealers have the man himself telephone within a certain time after his call, especially where he has made any demonstrations, or left an appliance on trial. He inquires of the prospect how the operation of the device suited, and gets a line on when he should make his personal, follow-up visit. In many large companies salesmen desire to be relieved of all the burden of telephoning that is possible, and the girl operator is entrusted with this work. If, for any reason, the prospect is dissatisfied with the salesman, it is wise to delegate the task of following up, and the closing of the order to someone else.

Particularly in campaigns where appliances are placed on trial for a certain definite period, the telephone follow-up comes in handy. Very often the prospect has not had time to try the device and it is a good plan to telephone before going out to remove it, to explain to her that if she has not had time to use it, "just as an accomodation to her" she may keep it a day or more longer.

To Develop Business From Customers

Few merchandisers think to use the telephone to get more business from old trade. The butcher, the grocer, the baker occasionally uses this means of increasing his business, but most electrical dealers have believed that since the appliance is not a "staple," hence the average family does not "repeat" on it, they could not increase their business from customers. Nevertheless there are electrical dealers who do figure each customer as a potential prospect for $150 worth of business, and as soon as they order one device they go after them for another. It is necessary to keep good records of what the customer has bought. It must be remembered that once a customer, the heaviest part of selling has been done—the introductory effort has been accomplished, and it is just so much easier to sell additional goods.

One dealer last spring sold hundreds of fans by simply calling up his customers and telling them that there was going to be a fan shortage, and he felt they ought to know about it, and order now, even if they didn't want their fan until later. He laid away fans for people who did not care to have immediate delivery. Incidentally he secured a large amount of repair business from people who decided to have their old equipment overhauled before the repair rush set in. Another dealer has a list of motor customers; he keeps careful records of when his customers may be in the market for re-orders and for maintenance and repair service. He uses nothing but the telephone to keep in touch with his trade. Still another telephones his customers about twice a year asking how the device he sold is working, and leading the conversation into such channels as this: "Mrs. Smith—it just occurs to me—do you know if Mrs. Blank, across the street does her washing electrically? I heard she was considering an electric washer, and I thought you might know." (Usually he gets a line on how his customer's neighbors does it.) Occasionally this dealer has offered his prospects a commission on any live prospect they turned over to him. He uses the telephone to let people know of this plan.

To Facilitate Collections

Business men are more familiar with the use of the telephone in this connection. There are many things which can

Second Call to All Electrical Men

Manufacturers, Jobbers, Central Station and Power Plant Men, Wholesalers, Salesmen, Contractor Dealers and all Members of the Electrical Industry

You are invited to come to the

GIGANTIC ELECTRICAL CONVENTION

To be held in the CITY OF VANCOUVER

May 26th and 27th Next.

The Chief Speakers will be

W. L. GOODWIN
Author of the Goodwin Plan
and
SAMUEL A. CHASE

and in all probability

SENATOR NICHOLLS, President Canadian General Electric Co.

All meetings will be open. You cannot afford to be absent from the greatest electrical gathering ever held in Western Canada.

Special arrangements will be made for the entertainment of the wives of the visitors.

Be sure to get on the mailing list. Write the Secretary, 406 Yorkshire Bldg., Vancouver, B. C.

be said over the telephone but would be unwise to put into a letter; yet there are times when those things should be said. In making collection it is wise to have this work done by the proprietor himself, or some one in authority within the organization.

To Adjust Complaints

Failure to make good on deliveries, deficiencies in the service, and other slip-ups in the merchandising scheme should have prompt and careful attention. But not enough companies go the limit in making good with customers. After the error has been rectified, it is a good plan to call up the party complaining and make sure they are satisfied. People who call up to make complaints do not want to make them to clerks, or operators; they want the attention of somebody in authority. Larger stores and companies have "Adjustment Bureaus" which handle all complaints. But it should be the rule to adjust complaints at once wherever possible. The telephone suppiles adequate opportunity for "locating the customer to it;" should an error be discovered in delivery, for example, the customer should be telephoned before he or she has had time to send in any complaint.

The plain is the thing. Plan your telephone campaign, then work your plan. Re-shape, re-build it as you have to, as you go along, but don't be discouraged if you don't get great results at once. Profit by your mistakes—try again.

Illuminating Engineering Society

The Toronto members of the Illuminating Engineering Society were treated to an illustrated lecture on "Store Lighting" by Mr. C. C. Bothwell, at 8 p.m., April 8th, in the assembly room of the Toronto Hydro-electric System's sub-station, southeast corner of Nelson and Duncan Streets. There were sixty-five interesting slides illustrating good and bad samples of lighting conditions throughout America. There was a good attendance and the members spent a most profitable evening.

Annual Meeting of National Association

The preliminary arrangements for the coming annual meeting of the National Association of Electrical Contractors and Dealers have just been completed. The convention will be held in Milwaukee, Wisconsin. The executive committee of the association will meet in the city on July 14 and 15, while the convention meetings will be July 16, 17 and 18. The headquarters of the convention will be at the Hotel Pfister.

Who's Fault Is It?

A new small house in one of the best residential districts in Toronto is on sale at the present time, the value being somewhere around eight thousand dollars.

There is one base plug in this house which the owner makes special mention of to all prospective customers. He invariably arranges a special trip back to the room containing this plug so as to properly impress his customer with this luxurious appointment. Frequently he is asked: "Why didn't you put one here, and here, and here?"—to which he replies: "Oh, no one ever puts in more than one."

Who will say that this is not the regular attitude of both the house-builder and the architect? We almost said the contractor, too. But in any case the contractor is to blame to a considerable extent for he knows the lamentable ignorance of the architect about these matters and ought to be trying harder to educate him. On the other hand the architect, after all, cannot be greatly blamed for no one ever pays much attention to his electrical specifications.

It is a lamentable fact that even the best houses are not being properly equipped electrically. How can we ever expect to sell appliances if we don't make provision for their use?

How I Increased My Sales 100 Per Cent.

By Mr. E. Brettell*

Last fall we purchased a number of Emeralite bed lamps fitted with the Wirt Dim-a-lite socket. We also had in stock a number of the well-known Little Wizard lamps. For a few weeks these lamps remained on display in our store, from time to time being placed in our show windows with other portable lamps, but we were very disappointed in the sale of both lamps.

One day, however, when we were devising means of pushing the sale of these particular lamps, one of us hit upon an idea and the result was extraordinary; this is what happened:

We borrowed an attractive bed and mattress from the Hudsons' Bay Company, nearby, and with the addition of sheets, blankets, pillows, etc., we put a display in our windows which contained nothing but this nicely made-up bed in which was reposing a large doll—which, by the way, was reading a booklet issued by us, entitled "Electrical Home Needs." To the rails of the bed above the doll's head were attached two of the lamps aforementioned, and a large card rested on the bed with the words "DO YOU READ IN BED?"

The result of this display was astounding. The lamps sold readily, and so great was the demand that our stock was exhausted and we had to wire the factory for a rush shipment. Although that display was in our window six months ago we are still selling these lamps to customers who remember noticing it as they passed.

[This bears out what Mr. Corcoran said in his address before the Toronto contractors. He told of a man who, after a good deal of hesitation consented to take one washing machine on trial from a certain manufacturer. Feeling that he would have it on his hands for some time he determined to give a washing machine display in his window, with the result that he sold the machine before he had time to complete his display. Mr. Corcoran also told of a certain store in New York that consistently displayed and demonstrated fans in the window last year, with the result that this store was always sending in repeat orders for more fans, while the other stores were complaining of slow sales.

This is just another case where the electrical dealer must profit by the experience of merchandisers in other lines of trade. The slogan of the shoeman, the haberdasher, and the grocer, is: "Put your window on your sales staff." What is the secret of the success of the Italian as a fruiterer? Surely it is effective window display. Think of the thousands of people who stroll down town evenings to see the department store windows—changed every day or two.

And remember too—there is nothing that makes a more attractive showing in a window than electrical goods, nothing that lends itself so readily to making an appeal to the popular attention. Don't delay longer—make your window a member of your selling staff from now on and see to it that, like the other members of your staff, it is clean, neat and carefully and attractively dressed.—Editor].

Weather-proof Condulets—Catalog No. 1000-J, by the Crouse-Hinds Company of Canada, describing weather-proof condulets for switches and plug receptacles. This is a supplement to Condulet Catalog No. 1000; well illustrated. The same company have issued Condulet Suggestion No. 14, showing conduit and condulets used on direct motor-driven machinery.

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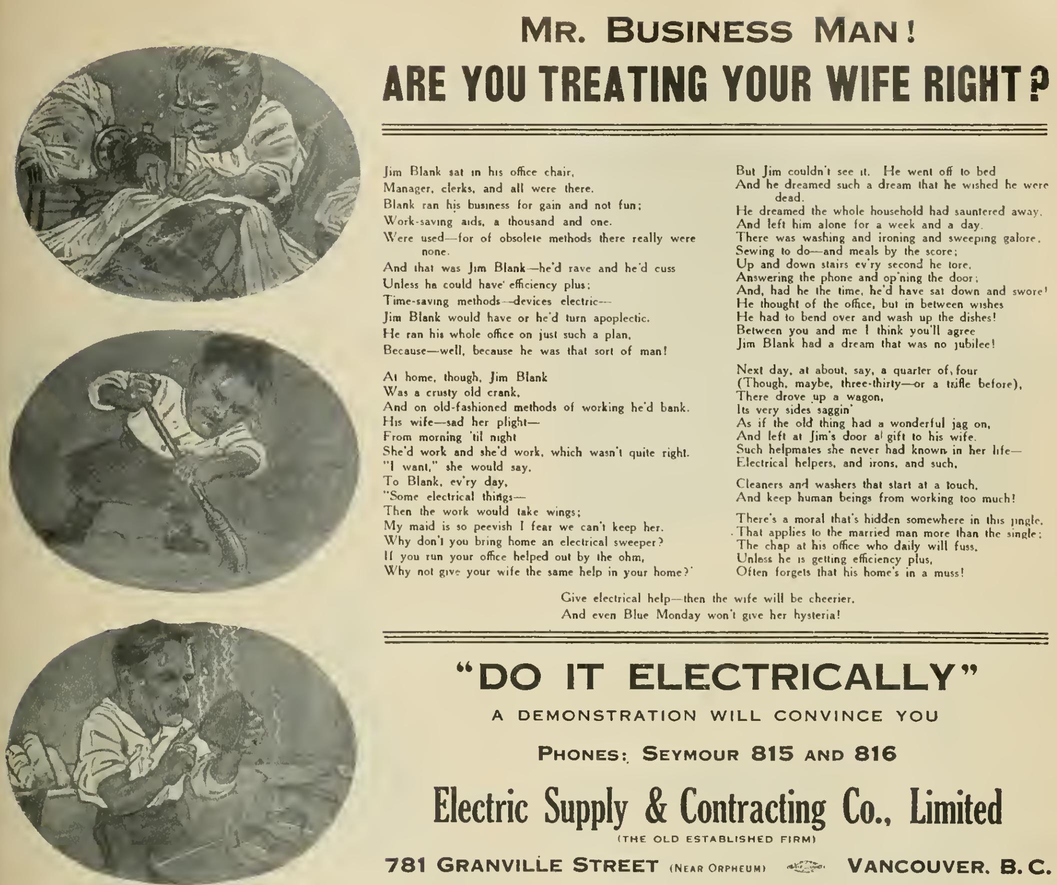
*Electric Supply and Contracting Company, Vancouver, President Vancouver Association Electrical Contractors and Dealers.



MR. BUSINESS MAN!
ARE YOU TREATING YOUR WIFE RIGHT?

Jim Blank sat in his office chair,
Manager, clerks, and all were there.
Blank ran his business for gain and not fun;
Work-saving aids, a thousand and one.
Were used—for of obsolete methods there really were none.
And that was Jim Blank—he'd rave and he'd cuss
Unless ha could have efficiency plus;
Time-saving methods—devices electric—
Jim Blank would have or he'd turn apoplectic.
He ran his whole office on just such a plan,
Because—well, because he was that sort of man!

At home, though, Jim Blank
Was a crusty old crank,
And on old-fashioned methods of working he'd bank.
His wife—sad her plight—
From morning 'til night
She'd work and she'd work, which wasn't quite right.
"I want," she would say,
To Blank, ev'ry day,
"Some electrical things—
Then the work would take wings;
My maid is so peevish I fear we can't keep her.
Why don't you bring home an electrical sweeper?
If you run your office helped out by the ohm,
Why not give your wife the same help in your home?"

But Jim couldn't see it. He went off to bed
And he dreamed such a dream that he wished he were dead.
He dreamed the whole household had sauntered away,
And left him alone for a week and a day.
There was washing and ironing and sweeping galore,
Sewing to do—and meals by the score;
Up and down stairs ev'ry second he tore,
Answering the phone and op'ning the door;
And, had he the time, he'd have sat down and swore!
He thought of the office, but in between wishes
He had to bend over and wash up the dishes!
Between you and me I think you'll agree
Jim Blank had a dream that was no jubilee!

Next day, at about, say, a quarter of four
(Though, maybe, three-thirty—or a trifle before),
There drove up a wagon,
Its very sides saggin'
As if the old thing had a wonderful jag on,
And left at Jim's door a gift to his wife.
Such helpmates she never had known in her life—
Electrical helpers, and irons, and such,

Cleaners and washers that start at a touch,
And keep human beings from working too much!

There's a moral that's hidden somewhere in this jingle,
That applies to the married man more than the single;
The chap at his office who daily will fuss,
Unless he is getting efficiency plus,
Often forgets that his home's in a muss!

Give electrical help—then the wife will be cheerier,
And even Blue Monday won't give her hysteria!

"DO IT ELECTRICALLY"

A DEMONSTRATION WILL CONVINCE YOU

PHONES: SEYMOUR 815 AND 816

Electric Supply & Contracting Co., Limited

(THE OLD ESTABLISHED FIRM)

781 GRANVILLE STREET (NEAR ORPHEUM) **VANCOUVER, B. C.**

A good advertising blotter distributed by Mr. Brettell's firm, the Electric Supply & Contracting Co., Ltd.

Western Men Are Back of the Big Vancouver Meeting

Mr. E. Brettell, President of the Vancouver Association of Electrical Contractors & Dealers, advises that electrical men throughout the west are backing up the idea of a gigantic electrical convention in Vancouver on May 26 and 27 very enthusiastically. Prominent mention has been made of the convention plans in recent issues of the Electrical News. A further announcement appears in this issue. Mr. Brettell also sent us along a couple of typical letters of a number he is receiving, promising support of the movement. One of these from Mr. Streb, The Electric Shop, Saskatoon, runs as follows:—

"Your communication inviting us to the Electrical Convention to be held in your city on May 26th and 27th next received. We are indeed glad to know that someone in this western country is starting the ball rolling in the interests of the contractor-dealers, as much is to be done and much can be done by the co-operation of all interested. If it is at all possible to get away at that time myself and Mrs. Streb expect to be with you."

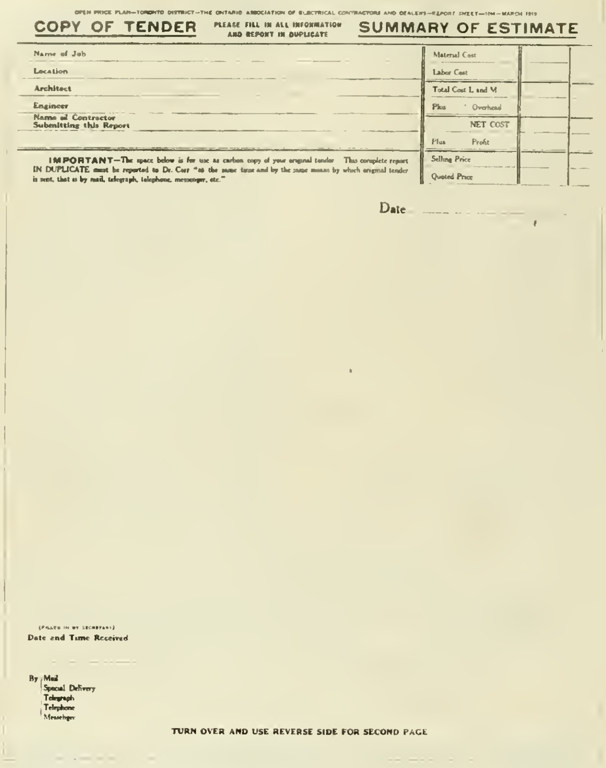
Another from Mr. Shortt, Manager Light & Power Company, Cumberland, B.C., says:

"Your kind invitation to be present at the Electrical Convention to be held on May 26th and 27th in your city reached me to-day. To hear Mr. Goodwin would indeed be a treat in itself. Mrs. Shortt and myself expect to be with you."

This is the kind of support Mr. Brettell and his executive are looking for. If you haven't told him yet, sit right down to-day and write "I'll be with you. What can I do in the meantime?"

Hamilton Electrical Association is Active

On Monday, March 31st, the Hamilton District Electrical Association held a meeting at the Royal Connaught Hotel, Hamilton. A large number of members and visitors were present to hear an address from Mr. L. B. Chubbuck, of the Canadian Westinghouse Company, Hamilton, on auto-starters, auto-transformers and overload relay coils. In view of the fact that overload relays are being used extensively, this address was very interesting and instructive. Samples were shown, with lantern slides. A number of visitors were present from the surrounding districts, even as far as Preston. Applications are being received continually for membership in the association. It is safe to say that few lecturers have proven more interesting to the association. Local 105 of the I.B.E.W. were largely represented at this meeting by special invitation. Mr. V. K. Stalford, president, occupied the chair.



OPEN PRICE PLAN—TORONTO DISTRICT—THE ONTARIO ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS—REPORT SHEET—10M—MARCH 1919

COPY OF TENDER PLEASE FILL IN ALL INFORMATION AND REPORT IN DUPLICATE **SUMMARY OF ESTIMATE**

Name of Job
Location
Architect
Engineer
Name of Contractor Submitting this Report

Material Cost	
Labor Cost	
Total Cost L and M	
Plus Overhead	
NET COST	
Plus Profit	
Selling Price	
Quoted Price	

IMPORTANT—The space below is for use as carbon copy of your original tender. This complete report IN DUPLICATE must be reported to Dr. Carr "at the same time and by the same means by which original tender is sent, that is by mail, telegraph, telephone, messenger, etc."

Date

(FILLED IN BY SECRETARY)
Date and Time Received

By Mail
Special Delivery
Telegraph
Telephone
Messenger

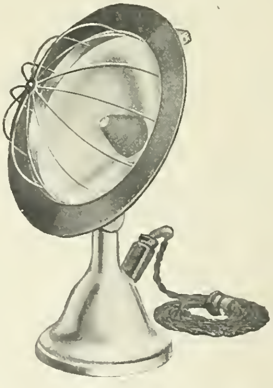
TURN OVER AND USE REVERSE SIDE FOR SECOND PAGE

Open Price Letter Form Used by Toronto Contractors

This is a reproduction of the standard letter sheet used by the Toronto district of the Ontario Association of Electrical Contractors and Dealers. Every member of the Association, when he tenders on a wiring job, sends a summary of his tender on this form to the Open Price secretary. The secretary makes duplicates, triplicates, or whatever is necessary, on the same forms and sends each man who tenders on this job a copy of the figures of every other man who tenders. The main body of the letter is for a copy of the original tender. The space at the right hand upper corner is for a summary of the figures, so that comparison of the various tenders may be readily made. The space at the left hand lower corner is filled in by the Open Price secretary and the method of delivery checked off as soon as the copy is received.

For Spring and Early Summer Heating

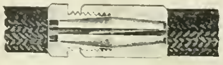
The season is upon us when it is too expensive and entails too much work to keep the coal furnace going, but when a little heat in the cool mornings and evenings is very necessary to our comfort. In other words it is the season for the electric heater. A new and very attractive design of the glow type is being put out by a number of Canadian manufacturers, the various units differing, of course, in certain details. One of these is shown herewith. It is manufactured by the National Electric Heating Company, Toronto. The only size at present available, we understand, is the 660 watt, but other and larger capacities are to be turned out later; the difficulty of getting material has not yet been entirely overcome. This heater has the concentrating feature which is now so popular, as it enables one to get effective heat just where it is wanted and in a minimum of time. The appearance of this unit, full glowing, is very beautiful, especially in a darkened room when one gets the impression of a ball of fire. This glower may be attached to the ordinary lighting socket.



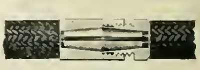
A Handsome Glower

New Type Dossert Connector

Dossert & Company, New York, announce a new type of solderless connector for splicing small wires. It is designated as Type D Dossert two-way connector and consists of male and female threaded parts acting upon a slotted tapered sleeve or bushing, making the splice by compression. These connectors are supplied in two sizes, No. 8 being for use on No. 8 and No. 9 wires, and No. 14, which can be used to connect Nos. 10, 12, or 14 wires as desired. Illustrations show actual size and detail.



Type D. No. 8 Dossert Connector,



Type D. No. 14 Dossert Connector,

New Benjamin Reflector and Diffusing Cap

The illustrations in Figs. 1 and 2 represent the new Benjamin Dome Reflector for Mazda "C" lamps. For this reflector the following qualities are claimed:

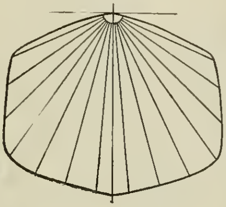
(1) A durable and highly reflecting surface.

(2) A contour which insures effective distribution for factory lighting.

(3) A minimum of glare.

The reflector is a one-piece unit with no welded joints and, therefore, no exposed edges which can corrode. The method of connecting reflector and socket to the support is very rugged. The cut in Fig. 3 shows a very efficient diffusing cup designed to fit snugly over the tip of the bulb. This cup is of opal glass and blends well with the white lining of the reflector, producing a restful and pleasing effect. This cup is specially recommended where any trace of glare would be greatly detrimental to the work, as in sewing, engraving and similar factories; fine machine work with bright machines or metals; micrometer work, and so on.

Reflector for Mazda "C" Lamps



Characteristic Curve

Diffusing Cap to Prevent Glare

Krantz Bulletin No. 1587

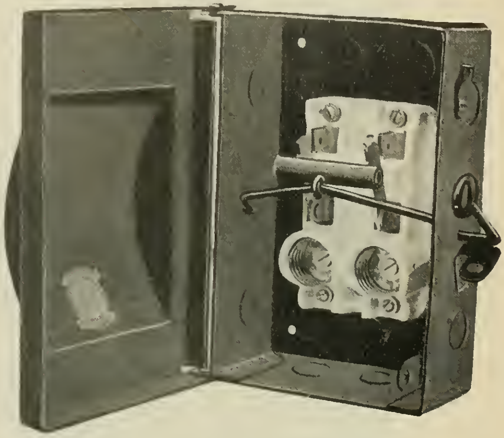
The Canadian Krantz Electric and Manufacturing Company, Limited, Toronto, are distributing Bulletin 1587, describing their complete line of safety, dead front, lightly panelboards and cabinets; also a smaller, pocket size, catalogue describing their safety type and Type B panelboards, auto lock switches, floor boxes, etc. The Canadian Krantz safety panel conforms to the latest ruling. It is noticeable that this company's circuit snap switches are of 30 amperes capacity which gives them ample copper so that they are mechanically strong and will stand the continual use which is frequently demanded of them.

Jefferson Glass Filling Big Contracts

The Jefferson Glass Company, Toronto, have closed contracts for supplying the glassware in both the Dominion Parliament Buildings, Ottawa, and the Manitoba Provincial Legislature Buildings at Winnipeg. Another large contract just taken is for the illuminating glassware required by the Halifax Housing Association for some three hundred houses. Robert Mitchell & Company are electrical contractors on the latter work.

New Safety-type Switch Boxes

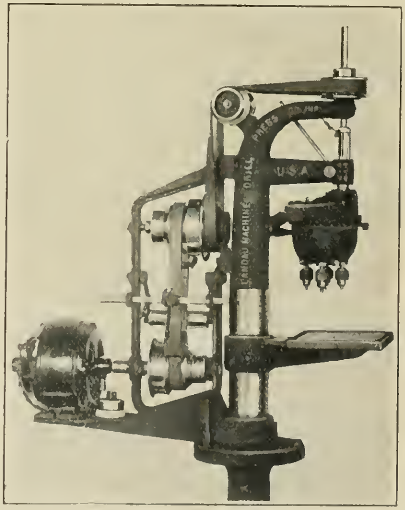
The illustration below shows one of the types of switch box now being manufactured by the Canadian Drill and Electric Box Company, Limited, 1402-10 Queen St., East, Toronto, formerly the Canadian Drill and Chuck Company.



This particular box is a 30 ampere, 125 volt, double pole type, with dimensions 8 inches long by 5½ inches wide by 2½ inches deep. The company's regular stock includes a complete line from 30 amperes, 125 volts, up to and including 1,200 ampere, 600 volts, with sufficient stock on hand to ensure prompt delivery and the best of service. Mr. Harley W. Morden is general manager of the new company and Mr. G. P. Ash is president.

Motor-operated Drill Press

A quarter horsepower motor operates the drill press shown herewith, which is manufactured by the Landau Machine and Drill Press Company, of New York. The illustration shows the bench type of drill press. The press comprises a driller and a multiple drilling head which houses four separate drilling spindles.



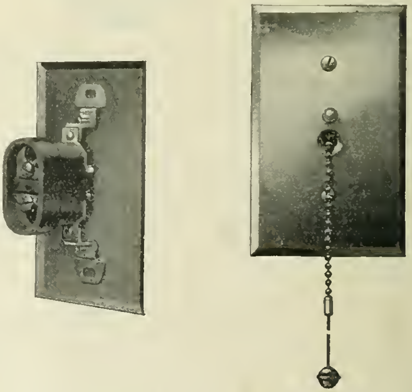
Where Harvey-Hubbell Equipment is "Made in Canada"

The Harvey Hubbell Company of Canada, Limited, have a fine new home at 7-21 Labatt Ave., Toronto, shown in the picture herewith, and it is no longer necessary to send your orders for Hubbell specialties to Bridgeport, Conn., because Mr. Mack has installed all the facilities for manufacturing in his Toronto factory and is now keeping well ahead of the demand. The writer had an opportunity of looking over the factory with Mr. Mack a few days ago and noted, with pleasure, the splendid and ample facilities for manufacture and delivery, which make this plant one of the most complete in Canada.

It is worth mentioning that this company have provided unusual facilities, in their new home, for the comfort and care of their employees, all of which helps to ensure the excellence of their product and the superiority of their service. Backed by such quality and service as the Harvey Hubbell Company of Canada supply, there should be little difficulty in establishing the "Made in Canada" label as the standard of excellence the world over.

Hospital Call Pull Switch

A new device called a "Hospital Call Switch," has just been developed by the Cutler-Hammer Manufacturing Co., Milwaukee. It is made for installation in a standard switch outlet box and the wiring does not extend beyond the box. No flexible conductors or push button switches are required for its use, consequently, the annoyance of having these parts broken and soiled is eliminated. Further, as the live parts terminate in the wall, there is no possibility of the patient coming in contact with them. From the accompanying illustration it will be seen that the new device consists of a C-H standard push and pull mechanism slightly modified. The switch is operated by pull chain. A linen cord placed within easy reach of the patient is used to pull the switch "on," the cord being attached to a short piece of chain which extends through a horn in the plate and is attached to a projection on a push-button. A pushbutton located above the horn extends through the plate and is used by the nurse to push the switch off. The plate is the same size as those used for wall switches and receptacles and the switches and the plates are made singly or in gangs. The new device may be used on any standard lighting circuit of 125 volts or less.

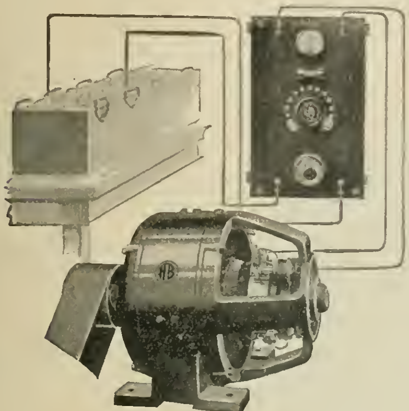


At left, rear view of hospital call switch. At right, illustration showing linen cord which the patient uses for pulling the switch on, and button above it which the nurse uses for pushing the switch off.

The General Railway Signal Company, Rochester, N.Y., have issued Bulletin 135, dated March, 1919, describing their "Absolute Permissive Block System Circuits." A number of interesting diagrams are included and fully described.

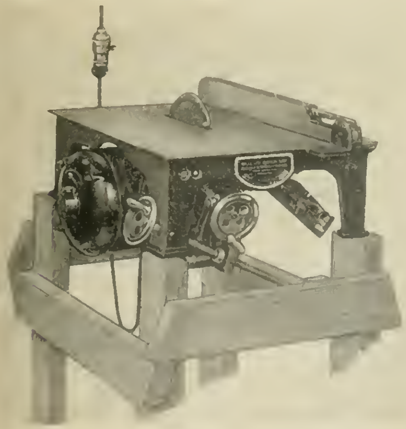
Lighting and Battery Charging Set

With the HB lighting and battery charging set, the garage that does not have electric current available from any public plant can make its own electric light and at the same time have the power necessary to handle the profitable business of recharging automobile storage batteries. The generator is a specially wound machine, 110 volts, direct current, speed 1800 r.p.m., weight 300 pounds. It operates from line shaft or engine, requiring 4 h.p. at full load. It supplies ample capacity for brilliant lights at low cost, and it will recharge at one time from one to six 6-volt auto storage batteries or their equivalent. The HB lighting and battery charging set is furnished complete in every respect, ready to belt to engine and operate. It includes generator, base tracks, field rheostat, charging panel, and pulley with 6-inch diameter and 4-inch face. No switchboard is necessary. Made and sold by Hobart Brothers Company, Troy, Ohio.



Electrically Operated Portable Bench Saw

The portable bench saw illustrated below is manufactured by the J. D. Wallace Company of Chicago. It is equipped with a half horsepower motor and so may be operated from an ordinary lighting socket. In addition to being easily portable, this saw has an added feature which would be impossible with any but electric motor drive, viz., it can be tilted at any angle—the motor being direct connected to the saw and both mounted on an arbor which swings as you operate the hand wheel. It is claimed that by the use of this electrically operated saw, operating costs in woodworking and similar factories can be greatly reduced.



A New O. B. Catalogue

The Ohio Brass Company, Mansfield, Ohio, have issued Catalogue No. 17 covering high tension porcelain insulators; overhead materials; rail bonds; car equipment, etc. This is a wonderfully complete catalogue of 650 pages, splendidly illustrated, containing a fund of information of particular interest to electric railway men. The catalogue is thumb-indexed under the following headings: Porcelain Insulators; Miscellaneous Pole Hardware; Trolley Materials; Catenary Materials; Bonds and Tools; Third Rail Insulators; Car Equipment; Tables.

Personal

Mr. Charles Duncan, of the Duncan Electrical Company, Montreal, is spending a holiday in the South.

Mr. Sam. A. Gaskell, Toronto, manager Lancashire Dynamo and Motor Company, sailed for England on April 10.

Captain F. D. Burpee, of Ottawa, has returned from three years' service overseas and resumed as superintendent of the Ottawa Electric Railway.

Mr. Frank A. Pumple, manager of the Eastern Electric Company, St. John, N.B., has resigned to join the Canadian General Electric Company, who are opening a St. John branch, with Mr. Pumple as manager.

Mr. Alexander Smith, of Chicago, has been elected a director of the Abitibi Power and Paper Company, replacing Mr. E. M. Mills, of Chicago, whose resignation was tendered during the last year.

Mr. Arthur Hilliard Foster, B.A.Sc., has been appointed manager of the Brantford Municipal Electric Railway. He is a graduate of the Faculty of Applied Science, University of Toronto, and has had considerable experience in railway work.

Mr. W. A. Black, vice-president and managing director of the Ogilvie Flour Mills Company, has been elected to the directorate of the Abitibi Power and Paper Company, filling the vacancy created by the resignation some months ago of Hon. Geo. Gordon, of North Bay.

At the annual meeting of the Canadian Westinghouse Company held recently, officers and directors were elected as follows: Directors:—Messrs. H. H. Westinghouse, Paul J. Myler, L. A. Osborne, Thos. Ahearn, Sir John M. Gibson, John F. Miller, F. A. Merrick, Warren Y. Soper, Charles A. Terry and Gen. Guy E. Tripp. Officers:—Messrs. H. H. Westinghouse, Chairman; Paul J. Myler, President; L. A. Osborne, Vice-President; F. A. Merrick, Vice-President and General Manager; W. E. Sprague, Secretary; Geo. R. Kerr, Treasurer; N. S. Braden, manager of sales; H. M. Bostwick, assistant manager of sales; C. H. O. Pook, manager of works.

An amendment to the Public Utilities Bill in the British Columbia Legislature, providing that the agreement between the B. C. Electric Company and the city of Vancouver authorizing a six cent fare would be terminated when the Public Utilities Act went into effect, failed to carry and the six cent fare still maintains. The idea was that the whole matter would have to be threshed out again before the Public Utilities Commission.

SALE OF

Surplus Military and Naval Stores

Dry Goods, Camp Supplies, Food, Hardware, Scrap Metal and Junk

Cloth; new and second-hand clothing, equipment, hardware, tents, blankets, camp supplies, etc. : : Flour, jam, canned evaporated milk, tea, coffee, etc. : : Condemned clothing, junk, old brass, metals, leather, rubber, etc.

Sales will be made by Sealed Tender

Persons desiring to tender are requested to communicate with THE SECRETARY OF THE WAR PURCHASING COMMISSION, BOOTH BUILDING, OTTAWA, stating the items in which they are interested, whether new or second-hand or both.

Arrangements will be made to have samples on exhibition at places throughout Canada; specifications, full details, and tender forms will be mailed when ready to those who have registered as suggested above.

If Interested Please Apply Now

Institutions May Make Direct Purchase Without Tender

Dominion, Provincial, and Municipal departments, hospitals, charitable, philanthropic, and similar institutions which are conducted for the benefit of the public and not for profit may purchase goods without tender at prices established by the War Purchasing Commission.

All communications should be addressed to the Secretary, War Purchasing Commission, Booth Building, Ottawa, who will be glad to supply lists and further details to those interested.

Current News and Notes

Arnprior, Ont.

The Galetta Electric Power Company, of Galetta, Ont., contemplate extending their line to Arnprior, Ont., and estimates are being prepared.

Bounty, Sask.

The village council of Bounty, Sask., contemplate the installation of an electric lighting plant.

Brantford, Ont.

New switching equipment is being installed at the Brantford hydro-electric sub-station.

The annual statement of the Brantford Hydro-electric Commission shows total earnings of $114,362.39, with a gross surplus of $28,666.75, as compared with $25,938.40 in 1917, and a net surplus of $18,586.75 after allowing depreciation of $10,080.

Broderick, Sask.

The village council of Broderick, Sask., have under consideration the installation of a plant to supply electric light to the village.

Burns Lake, B.C.

Messrs. F. R. Keefe and Charles Wallace propose erecting a dam on the Stellace River, near Burns Lake, B.C., and using the power produced to operate a large mill, construction on which will be commenced very soon.

Clark's Harbor, N.S.

It is reported that the town council at Clark's Harbor, N.S., are considering the installation of a small electric lighting plant.

Guelph, Ont.

A delegation from Elora, Ont., recently visited Guelph regarding a proposed extension of the electric railway from Hespeler north to Mount Forest by way of Guelph. Elora is anxious to have connection with Guelph and is willing to guarantee bonds covering cost of the extension. The line to Hespeler would be operated by the C. P. R. as an extension of their Galt to Hespeler branch.

The Wendigo Power Company, Limited, Guelph, Ont., has been granted letters patent "to carry on the business of an electric light, heat and power company in all its branches." The capital stock is $1,000,000.

Halifax, N.S.

At the annual meeting of the shareholders of the Nova Scotia Tramways and Power Company, March 31, all the old members except Mr. H. R. Mallison, went off the board of directors. A new board representing largely the Boston interests in the company was elected. The new board is as follows:—W. H. Covert, K.C., Halifax; H. R. Mallison, Halifax; F. B. Adams, New York; F. P. Boyce, Boston; M. L. Sperry, Boston; L. B. Buchanan, Boston; W. C. Crawford, Boston; M. M. Phinney, Boston; Royce Ernst, Boston. The directors will meet later on to elect a president.

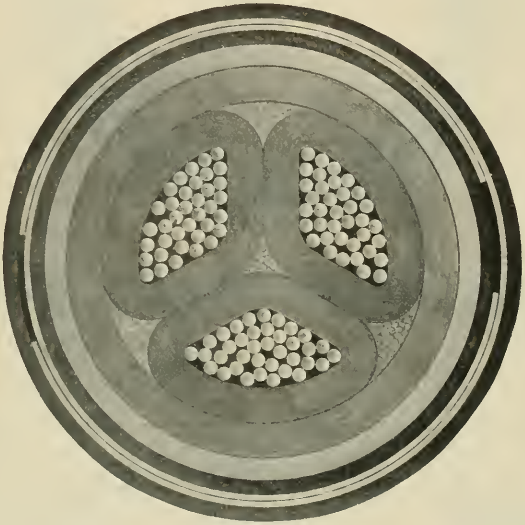
Kenora, Ont.

The town council of Kenora, Ont., have ordered 500 meters from the Canadian Westinghouse Company which will be installed in all premises now using current on the flat rate.

London, Ont.

The city council of London, Ont., after nearly a year's controversy, have agreed to grant an increase in fares to the London Street Railway and to make application to the Ontario Legislature for validation of the necessary amendments in the company's franchise. The company will be empowered to charge a five cent cash fare; six tickets for a

POWER CABLE



350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

---

Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary Vancouver

quarter, good at any time. The company at present charge five cents cash, but strips are sold of seven and nine for a quarter. The new rate will be six and seven for a quarter, the latter being workingmen's tickets. Another problem faced by the railway company is a demand by the employees for ten cents an hour increase.

Montreal, Que.

The Westmount Electrical Company (Geo. E. Hayes), is a recently registered company. They will carry on an electrical contracting business.

Gagnon & Dubeau, electric contractors, Montreal, Que., have registered partnership.

The Crown Electric Company (William Flood), Montreal, Que., is named among recent registrations.

The Dominion Electrical Supply Company (Henry Hamlet), Montreal, have registered.

Ottawa, Ont.

Tenders are being received until April 30 for an electric clock system, fire alarm system and annunciators for the new Dominion Parliament Buildings at Ottawa, Ont. Plans are at the office of the general contractors, P. Lyall & Sons Construction Co., Ottawa.

Port Arthur, Ont.

The Sanderson Electric Company, Limited, Port Arthur, Ont., have been granted an Ontario charter.

Regina, Sask.

Estimates for the Regina Municipal Electric Railway Department for the coming year make provision for an estimated deficit of $22,526. The deficit last year was $67,844 and the estimated deficit $46,824.

St. Catharines, Ont.

Lincoln County Board of Agriculture have decided to request the Ontario Hydro-electric Commission to use its influence with the Provincial Government to have the act amended to permit counties as well as townships and urban municipalities to purchase and distribute blocks of electric energy for lighting and power in rural constituencies.

Three Rivers, Que.

It is reported in the daily press that the Canadian Pacific Railway contemplate electrifying their branch line from Three Rivers to Shawinigan Falls and Grand'Mere, Que.

Toronto, Ont.

The Toronto Railway Company have, owing to increased operating costs, been forced to forego the usual quarterly dividend on their $12,000,000 outstanding common stock.

The agreement between the Toronto Street Railway Company and its employees expires at the end of May, when it is anticipated the men will ask for an eight-hour day with equal, or higher than present rates of pay.

As a result of a conference of delegates from various municipalities affected and the Ontario Hydro Commission recently it has been decided by the latter body to apply to the government for permission to proceed immediately with the construction of the proposed radial railway between Toronto and Port Perry.

The A. M. Castle Engineering Company, Limited, have been granted letters patent under the Ontario Companies Act; head office Toronto, capital stock $275,000. They are empowered to manufacture all classes of machinery, including electrical power plants.

The Excelsior Electric Company, Limited, Toronto, have obtained a charter.

Electrical Switch Boxes

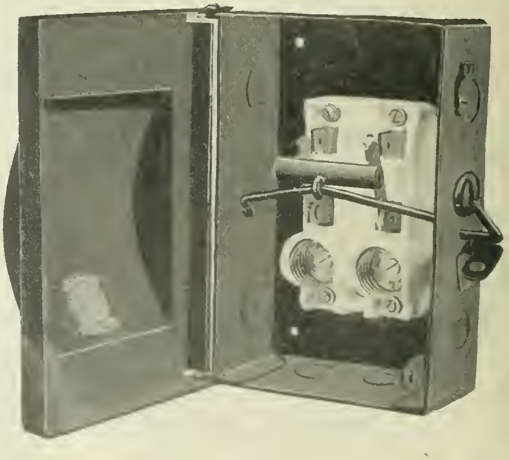
Form Steel Boxes, Motor Starting Switches (Steel Enclosed), Motor Drip Pans, Motor Covers, Rheostat Boxes and Accessories.

The illustration shows our new Service Box No. 1005, 30 Amp., 125 Volt, double pole, size 8" long x 5½" wide x 2½" deep.

A well made box with carrying capacity up to standard in every way and approved by Hydro Electric Commission. This box has been especially designed as a time-saver, and it can be installed in less time than any other box on the market. We will install knock-outs to suit your own requirements in any of our service equipments.

Our regular stock includes a complete line from 30 Amp. 125 volt up to and including 1200 amp. 600 volt. We have at all times from 4000 to 5000 Type E. Boxes on hand for immediate shipment insuring you the best of "Service" which is our motto.

Canadian Drill and Electric
Box Company, Limited
1402-10 Queen St. East - TORONTO



Kraft Cord "Braiduct"

Made in Canada under Canadian Patent No. 147,057

This cut is reproduced from an actual photograph, and illustrates the behavior of the material in this rigid test—perfect flexibility. We cut the ends to show plainly the superior construction—note the high grade Canvas Duck Lining and the KRAFT CORD winding. This KRAFT CORD is made to our own specifications and is fire-proofed, which is entirely new.

KRAFT CORD "BRAIDUCT" is in a class by itself—superior to any imported conduit—is absolutely the last word in flexible non-metallic conduit construction.

We are now making our own insulating compounds, consequently every lot will be uniform in flexibility, and every foot is fished at the factory.

KRAFT CORD "BRAIDUCT" is easy to instal—easy to cut—easy to secure, as it is made in our own country, and easy to buy, as our price is right.

KRAFT CORD "BRAIDUCT" is packed in heavy fibre boxes, each box containing four coils (1,000 ft.), insuring product against damage in transit.

KRAFT CORD "BRAIDUCT" is regularly inspected and labelled by the **Underwriters' Laboratory** under the direction of the **National Board of Fire Underwriters** and every coil carries their label.

We will be glad to send you a sample.

The Flexible Conduit Co.

Limited

Guelph - Canada

Electrical Books—Special Prices

The following Books are Offered Subject to Previous Sale:

"American Electricians' Handbook, a reference book for practical electrical workers, by Terrell Croft. 712 pages, with over 900 illustrations. Published by McGraw-Hill Book Co. Price $3.00.

A Handbook on the Steam Engine, by Herman Haeder. Published in 1914 by Crosby, Lockwood & Son. 522 pages, illustrated. Price $3.00.

A Laboratory Manual of Alternating Currents, by John H. Morecroft, E.C. Published in 1912 by Renouf Publishing Company. 248 pages, illustrated. Price $2.00.

Baudot Printing Telegraph System, by H. W. Pendry. Published in 1913 by Whittaker & Company. 144 pages, illustrated. Price $1.00.

"Central Stations," by Terrell Croft, 1st edition published in 1917, by McGraw-Hill Book Co., Ins. 332 pages, illustrated. Price $2.50.

Direct-Acting Steam Pumps, by Frank F. Nickel. Published in 1915 by McGraw-Hill Book Company. 258 pages, illustrated. Price $3.00.

Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, just published by McGraw-Hill Co., Inc. 285 pages, illustrated. Price $2.50.

Dynamo-Electric Machinery, by Francis B. Crocker, E. M., Ph.D. Published in 1908 by American School of Correspondence. 236 pages, illustrated. Price $1.00.

Electric Arcs, by Clement D. Child, Ph.D. Published in 1913 by D. Van Nostrand Company. 194 pages, illustrated. Price $2.00.

Electric Car Maintenance, by Walter Jackson. Published in 1914 by McGraw-Hill Book Company. 274 pages, illustrated. Price $2.00.

Electric Railway, by A. Morris Buck, M. E. Published in 1915 by McGraw-Hill Book Company, Inc. 390 pages, illustrated. Price $3.00.

Electric Railway Engineering, by C. Francis Harding, E. E. Second Edition. Published in 1916 by McGraw-Hill Book Company. 416 pages, illustrated. Price $3.00.

"Electric Traction," a treatise on the application of electric power to tramways and railways, by A. T. Dover. Published in 1917 by Whittaker & Co. 661 pages with 518 illustrations and five folding plates. Price $6.00.

Electrical Injuries, by C. A. Lauffer, M.D., published in 1912 by John Wiley & Sons. 77 pages. Price 50 cents.

Electro-Dynamics, by Charles Ashley Carus-Wilson. Published in 1898 by Longmans, Green & Company. 298 pages. Price 50c.

Elementary Principles of Illumination and Artificial Lighting, by Arthur Blok, A.M.I.E.E. Published in 1914 by Scott, Greenwood & Son. 235 pages, illustrated. Price $1.00.

Elementary Graphic Statics, by John T. Wight. Published in 1913 by Whittaker & Company. 226 pages, illustrated. Price 75c.

Elementary Magnetism and Electricity, by Cyril M. Jansky, B. S. Published in 1914 by McGraw-Hill Book Company. 212 pages, illustrated. Price $1.50.

Examples in Alternating-Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price $2.00.

Examples in Magnetism for Students of Physics and Engineering, by Prof. F. E. Austin, B. S. Published in 1916. Price $1.00.

First Aid in Case of Electrical Shock, by Dr. John Woodman. Published in 1908 by the New York Edison Company. Illustrated. Price 50 cents.

"Fuel," by C. F. Herington, recently published by D. Van Nostrand Co. 211 pages, with 84 illustrations. Price $3.00.

Handbook of Machine Shop Electricity, by C. E. Clewell. Published in 1916 by McGraw-Hill Book Company. 461 pages, illustrated. Price $3.00.

How to Make High-Pressure Transformers, by Professor F. E. Austin. Second edition, just published. 48 pages, illustrated, price 65c.

"Powdered Coal as a Fuel," by C. F. Herington, recently published by D. VanNostrand Co. 211 pages with 84 illustrations. Price $3.00.

Practical Electric Illumination, by Terrell Croft, First edition, published by the McGraw-Hill Book Co. 225 pages, illustrated. Price $2.00.

Principles of Direct Current Machines, by Alexander S. Langsdorf, M. M. E. Published in 1915 by McGraw-Hill Book Company. 404 pages, illustrated. Price $3.00.

Principles of Alternating Current Machinery, by Ralph R. Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price $4.50.

Principles of Electrical Design—D.C. and A.C. Generators, by Alfred Still. Published in 1916 by McGraw-Hill Book Co. 365 pages, illustrated. Price $3.00.

Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price $2.00.

"Radio Communication, Theory and Methods, with an appendix on Transmission over Wires," by John Mills. First edition, just published by McGraw-Hill Book Co., Inc. 205 pages illustrated. Price $1.75.

Radiation, Light and Illumination, by Steinmetz. Published in 1909 by McGraw-Hill Book Company. 304 pages, illustrated. Price $2.50.

Standard Wiring, 1919 Edition, 25th Year. The National Authority on Wiring and Construction. By H. C. Cushing, Jr. Leather cover, pocket size. Price $1.50 postpaid.

Steam Power Plants—Their Design and Construction, by Henry C. Meyer. Published by McGraw-Hill Book Company in 1903. 158 pages, illustrated. Price 50c.

Steam Turbines, by Robert M. Neilson. Published in 1903 by Longmans, Green & Company. 294 pages, illustrated. Price $1.00.

Steam Turbines, by Kennedy. Published in 1910 by Whittaker & Company. 100 pages, illustrated. Price $1.00.

Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Just published, by Longmans-Green & Co. 102 pages. Price $1.00.

Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price $2.00.

Telegraphy, by Sir W. H. Preece, K.C.B., and Sir J. Sivewright, M.A. Published in 1905 by Longmans, Green & Company. 504 pages. Price $1.00.

Test Methods of Steam Power Plants—A Reference Book for the Use of Power Station Engineers, Superintendents and Chemists, by Edward H. Tenney, B.A. M.E. Published in 1915 by D. Van Nostrand Company. 224 pages, 85 illustrations. Price $2.50.

The B.I. Hand-Book, published by British Insulated & Helsby Cables, Limited. Second edition. 448 pages, illustrated. Price $1.00.

The Electrical Contractor; Principles of Cost-Keeping and Estimating, by Louis W. Moxey, Jr. Published in 1916 by McGraw-Hill Book Company. 86 pages, illustrated. Price $1.50.

The Dynamo (2 volumes), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price $4.00.

The Lighting Art, Its Practice and Possibilities, by M. Luckiesh. First edition, just published by McGraw-Hill Book Co., Inc. 229 pages, illustrated. Price $2.50.

The School of Practical Electricity (Electrician's Course in 2 volumes). Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price $4.50.

The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 75c.

Transmission Line Crossings, by Frank F. Fowle. Published in 1909 by D. Van Nostrand Company. 69 pages, illustrated. Price $1.00.

Treatise on Thermodynamics, by Dr. Max Planck. Published in 1903. 272 pages. Price $1.00.

Wray's Manual of Car Lighting. Published in 1915 by Wray Publishing Company. 340 pages, illustrated. Price $1.50.

ELECTRICAL NEWS, 347 Adelaide St. W., Toronto, Ontario

GET THE GENUINE
Look for the Name
WHITE'S PORCELAIN STRAIN INSULATORS

You want strain insulators that are strong physically, that stand up under the exceptional conditions of the heavy storm; that hold up under a load of sleet; that don't crack when the thunder rolls, the lightning flashes, and the wind whistles.

This is the kind of strains T. C. White Company is making of porcelain in a variety of sizes for different loads, and several designs for varying conditions.

It will pay you to write for bulletin which shows designs and gives the complete data on strain and electrical tests.

Write today.

Type No. 600

T. C. White Electrical Supply Co., 1122 Pine Street,
ST. LOUIS, Mo.

Made in Canada
Conduit

XCELADUCT

Labelled under supervision of Underwriters' Laboratories

(GALVANIZED)

Manufactured by
Orpen Conduit Co., Limited
Toronto

Condensed Department

Publisher's Notice

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

Small Transformers FOR SALE

A number of 600 watt and 1000 watt C. G. E. type H transformers for sale at very low prices. Guaranteed O.K. Pay for them after you try them out on your own lines.

Stormont Electric Light Co.,
7-8 Cornwall, Ont.

PARLIAMENT BUILDINGS, OTTAWA

Tenders Wanted
for
Electric Clock System, Fire Alarm System, Sessional Gong System, and Annunciators

Sealed tenders will be received by the undersigned until noon, **April 30, 1919**, for:—

(1) Electric Clock System.
(2) Fire Alarm System.
(3) Sessional Gong System.
(4) Annunciators.

All tenders to be based upon the manufacture, supply, delivery and installation complete of the "Electric Clock System"; and on the manufacture, supply and delivery of the "Fire Alarm System, Sessional Gong System, and Annunciators."

The work of this contract shall be proceeded with in such a way that the apparatus required for the "Fire Alarm System," for the "Sessional Gong System," and for the "Annunciators" will be delivered complete at the building within two (2) months of the signing of the contract; and the "Electric Clock System" will be completed by **November 30, 1919.**

Plans, specifications, and any other information required can be obtained at the office of the General Contractors, P. Lyall & Sons, Construction Company, Limited, Ottawa.

Each Tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Minister of Public Works, for a sum not less than five per cent. (5%) of the amount of the tender, which will be forfeited if the parties tendering decline to enter into a contract when called upon to do so. If the tender is not accepted the cheque will be returned. If the tender is accepted an additional cheque for a sum equivalent to five per cent (5%) of the tender must be deposited before the contract is signed. The total security will be forfeited if the contractor fails to complete the work contracted for.

Payment for material will be made monthly.

The lowest or any tender not necessarily accepted.

Envelopes containing tenders to be marked: **"Tenders for Electric Clock System, Fire Alarm System, Sessional Gong System, and Annunciators,"** and addressed to the undersigned.

JOHN A. PEARSON, Architect.
J. O. MARCHAND, Associate.
Central Block, Parliament Hill,
Ottawa. 8

ELECTRICIAN, experienced in the operation of hydro-electric power plants and at present superintendent of plant, would like similar position. Apply Box 888, Electrical News, Toronto, Ont. 6-9

WANTED AT ONCE, Electrical Draftsman, experienced on water power station design. State training and experience, references and salary expected. Box 913, Electrical News, Toronto, Ont. 8

Electrical Draftsman

for generating station and sub-station design and layout. State experience and minimum salary. Apply

Hydro-Electric Power Commission of Ontario
190 University Ave., Toronto, Ont.
8

For Sale

1—150 H.P. Corliss Steam Engine, made by Cowan & Co., Galt, Ont. Girder frame, left hand drive, side crank, 13" x 26" fly wheel.

Will sell at a bargain.

Full particulars on application to

Hydro Electric Commission,
5-t.f. of St. Thomas, Ont.

New York's Jeweled Portal for Home Coming Soldiers

What is considered by many to be the most superb piece of decorative lighting in the history of the art, surpassing any individual effort made at the Panama Pacific International Exposition, has been erected at the corner of Fifth Avenue and Sixtieth Street, New York city, in honor of the homecoming regiments. This jeweled portal was created in the illuminating engineering laboratory of the General Electric Company at Schenectady under the direction of Walter D'Arcy Ryan. The arch is really a gigantic curtain of jewels draped between two obelisk forms. The obelisks rise to a total height of 80 ft., and are surmounted by great jeweled forms in the shape of sunbursts 12 ft. wide and 20 ft. high. Approximately 30,000 jewels from the famous Tower of Jewels of the Panama-Pacific International Exposition are used in the gigantic curtain, and when in use beams of light from arc projectors are thrown on the arch, causing the thousands of jewels to flash the brilliant and pure colors of the spectrum. The arch was designed especially for the purpose of jeweled decoration and the effect is gorgeous.

Disposal of Obsolete and Shopworn Goods

Once or twice a year, according to the amount of goods on hand, the Philadelphia Electric Company holds an auction sale for the benefit of its employees. The articles which are sold by auction are either shopworn goods or else discarded or more or less obsolete types of electrical goods. Consequently they could not be sold to regular customers. Many of the parts cannot be supplied readily, and the goods are not so modern as other articles of the same kind that are on sale.

The articles vary from washing machines and carpet sweepers to toasters, broilers, hair curlers, lamps and lamp shades, flatirons, etc. The employees are told the exact condition of the articles and that they are discarded or obsolete types. All are in excellent repair, and where parts are missing, like cords, this fact also is stated.

No effort is made to get big prices or to obtain any profit; yet, in spite of this, some articles are sold at prices near the retail cost. Everything is done on a cash basis. Usually a hundred or more articles are placed on sale, and in most cases the bidding is spirited.

PETRIE'S LIST
of NEW and USED
MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
2	52	3	25	550	720	Lancashire
1	40	3	25	550	710	Westg.
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	30	3	25	550	710	Westg.
1	30	2	60	220	720	Fbks-M.
1	25	3	25	550	1440	J. & M.
1	25	3	25	550	725	Westg.
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
1	20	3	25	550	1420	Westg.
2	20	3	25	550	710	Westg.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	15	3	25	550	710	Chap. & W.
2	10	3	25	550	1400	Lancashire
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
4	4	3	25	550	1400	Excelsior
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A Canadian Institute of Electrical Engineers?

A committee of the Toronto branch of the American Institute of Electrical Engineers is working on a report regarding the formation of a Canadian Institute of Electrical Engineers, to remain in affiliation with the parent body. As an alternative it is suggested that electrical engineers should form sub-branches in the various towns and cities and affiliate with the branches, in those towns, of the Engineering Institute of Canada.

There are undoubtedly arguments in favor of both courses and certain advantages to be gained. Affiliation with the E. I. C. offers the advantage of numbers and would enable this organization to build a stronger financial foundation. On the other hand the connection with the A. I. E. E. and the monthly proceedings are something no Canadian member would for a moment consider shutting himself off from.

After all the whole question seems to resolve itself into whether the members of the A. I. E. E. shall remain "electrical engineers" or whether they shall lose their identity in the bigger organization and become just "engineers." This latter would be a considerable sacrifice and it is not plain that there is a sufficient compensating gain. The big argument of those who favor affiliation with the E. I. C. is that "there's strength in numbers." This is true, of course, but is it not also true that the strength of two organizations of (say) two thousand members each is just as great as that of one single organization of four thousand members?

It is a momentous question that ought not to be decided on a snap vote. Also it is surely unwise to resort to threats of coercion as were suggested recently. Let us carefully place on opposite sides of the ledger the advantages of each that the other does not offer and balance up. That will be our endeavor in a future issue and readers are asked to co-operate.

Alberta Electrical Engineers Have Organized

At an enthusiastic and well attended meeting held in Edmonton on March 31st, it was resolved to form an electrical association to be known as the Alberta Association of Electrical Engineers. At this meeting by-laws and a constitution which had previously been drawn up, were adopted and an executive consisting of the following gentlemen appointed:

Chairman Northern Division, A. W. Ormsby, City Commissioner.

Vice-chairman, A. J. Cantin, Dominion government electricity inspector.

Secretary, W. J. Murphy, assistant superintendent Light and Power.

Bert L. Perry, electrical engineer and contractor.

R. B. Baxter, plant superintendent Alberta Government Telephone.

J. E. Lowry, superintendent city telephone system.

The constitution contemplates an all-provincial association with a Northern and Southern division, the headquarters of the Northern division to be at Edmonton and the Southern division at Calgary. The constitution is modelled along the lines of those of the American Institute of Electrical Engineers and allows for associates, members and honorary members.

It is not yet decided whether they will ask permission from the American body to form a local section or will retain their own identity as a provincial organization. However, in the event of allying with the U. S. body, very few changes in the by-laws and constitution would be necessary.

Article 2 of the constitution is explanatory of the objects of the association and is as follows:

"Among the objects of the association shall be the advance of electric engineering practice throughout the province. The standardization of all types of electrical plant construction. A common and uniform system of accounting in connection with the operation and maintenance of all electrical utilities. The maintenance of a high standard of professional ability among its members and by establishing such rules and regulations of the association pertaining to the construction, operation, and maintenance of electrical plant, throughout the province that they shall be considered authoritive.

"Toward this end meetings shall be held for the reading and discussion of professional papers and to take such other action which will result in the betterment of conditions pertaining to electrical industries throughout the province of Alberta."

It was stated by the members who attended this meeting that the necessity for the electrical engineering society had been apparent for some time and that judging by the success of the meetings held up to the present, the future of the A.A.E.E. is already assured. From returns to date it is belever up, and with the switch blades also in that position. To members in the Northern Division by the end of the year.

The Southern Section is in process of organization and should be completed at an early date. The executive of both divisions will form the Board of Directors for the province.

Telephone Business in Canada Grows

Statistics relative to telephone and telegraph companies doing business in Canada, covering the year which closed on June 30th, 1918, with comparative figures for the previous twelve months, were tabled in the House of Commons recently by the Minister of Railways. A substantial development of the telephone business is noted. The number of reporting companies increased from 1,695 in 1917 to 2,007 in 1918.

The growth was greater in Saskatchewan than in any other province. The number of reporting units by provinces were as follows: Prince Edward Island, 32; Nova Scotia, 143; New Brunswick, 31; Quebec, 173; Ontario, 528; Manitoba, 308; Saskatchewan, 727; Alberta, 8; British Columbia, 14; Yukon, 1.

It is noted that the governments of Alberta and Manitoba own practically all of the telephone systems in the two provinces. Saskatchewan is also a large owner of telephones, but there are, in addition, in that province, about 1,000 lines in the hands of private organizations.

The capitalization of telephone companies operating in Canada is given as $85,274,691, and the cost as $104,368,627, an increase of $10,000,000, as compared with 1917.

Earnings of the telephone companies in the last twelve months under review amounted to $22,753,289, while operating expenses totalled $13,644,524. Net earnings as reported in the difference between gross receipts and operating expenses were $9,108,765, in 1918, as compared with $8,025,855, in 1917. Additions to and subtractions from primary net earnings reduce that amount to $5,187,323.

Telegraph Business

Coming to the telegraph companies, the figures presented show that on June 30th, 1918, their cost was placed at $10,226,988, a slight increase over the previous year, while the capitalization of the companies having headquarters in Canada was $6,300,000. The gross revenue was $7,770,646, as compared with $7,272,755 for the previous twelve months. Operating expenses were $5,820,335, as compared with $4,940,228 during the previous year. The net operating revenue amounted to $2,016,429. Wire mileage totalled 210,100, a slight increase over the previous year. The number of telegraph offices totalled 4,664, as against 4,615, at the end of June 1917.

Toronto Section A.I.E.E. Elects Officers

The annual meeting of the Toronto Section of the American Institute of Electrical Engineers was held at the Engineer's Club rooms on Friday evening, April 25. Mr. W. B. Buchanan, of the Ontario Hydro Laboratories, delivered an address on the subject, "Some Overload Limitations of Current Transformers."

The following officers were elected for the ensuing year:

Chairman, Ashton B. Cooper, Canadian General Electric Company.

Secretary, Daniel M. Fraser, Canadian General Electric Company.

Executive, L. B. Chubbuck*, Canadian Westinghouse Company; A. C. Johnston, Canadian Westinghouse Company; H. C. Don Carlos, Ontario Hydro-electric Power Commission; F. R. Ewart, Ewart & Jacob; C. Sisson*, Canadian General Electric Company; W. Volkman, Toronto Power Company.

*Out of town members.

The next meeting of the Section will be held on Friday, May 2nd, when a lecture will be delivered by Professor Vladimir Karapetoff, of Cornell University, on the subject "The Fundamentals of the Magnetic Circuit."

Electrification of Steel Mills

G. E. Stoltz, of the Westinghouse Electric and Manufacturing Co. of Pittsburg, addressed a joint meeting of the Hamilton branch of the Engineering Institute of Canada, and the Toronto section of the American Institute of Electrical Engineers, on April 11th, in Hamilton. The subject of the address was the electrification of steel mills, and the speaker described, with the help of many lantern slides, the advantages of electric motors over steam engines in every application of power in the manufacture of steel. The address was followed by an interesting discussion by the engineers present. The meeting, the attendance of which was over 150, was held in the auditorium of the new office building of the Canadian Westinghouse Co., Hamilton. On the following day, the visitors from Toronto, accompanied by a number of local engineers, visited the plants of the Dominion Foundries and Steel, Ltd., the Dominion Power and Transmission Company, and the Steel Co. of Canada.

Montreal Electric Club

In a paper on "Defective Lamps," read at the Montreal Electrical luncheon, on April 16, Mr. P. Klein, Jr., described in detail the causes of defective lamps, such as failures of bulbs, mechanical supports, filament supports, burn outs, broken filaments, etc. The evaporation of tungsten from the filament was one of the principal causes of the ultimate failure of the lamp, the amount evaporated being regulated by the temperature. A lamp was rated to burn 1,000 hours, and it paid to discard lamps which had burned that time. While it was not always possible to tell the causes of failure, there were, as a rule, indications which were good guides. A rise of 10 per cent. in voltage reduced the life of a lamp by 60 to 70 per cent., and it was, therefore, important for large users of lamps to ascertain the proper voltage of the lamps they purchased.

Toronto Club Hears About Chippewa Plant

Mr. Harry G. Acres described the plan and the development work to date, on the big Chippewa Power scheme, before a record attendance at the April 25th meeting of the Electric Club of Toronto. Mr. Acres first referred briefly to alternative schemes and explained in general outline the advantages of the plan finally adopted, which is approximately a four-mile dredge up the Chippewa River, and an eight-mile cut through earth and rock. Some particularly good lantern slides assisted Mr. Acres to give the members a good general idea of the whole scheme of operations, which is simply colossal in magnitude. The whole of the equipment, as a speaker observed, is "special" and the fact that such splendid progress has been made, under conditions for which there was no precedent to follow, reflects the greatest credit on the whole Hydro staff.

The chairman, Mr. K. J. Dunstan, in thanking the speaker, made reference to the pride the members all felt in the fact that this record development scheme was being carried on in our own Dominion and under the entire guidance of Canadian engineers. Mr. Dunstan also took occasion to express the thanks of the members of the club to Mr. P. A. Borden for his unselfish and most efficient assistance during the year, without which the splendid illustrated lectures delivered before the Club would have been impossible. The members, by their applause, clearly indicated their acquiesence in the president's remarks.

The meeting of Friday, May 2, will be addressed by Mr. Paul Balbaud, recently returned from France and Germany.

The annual and final meeting of the year for the presentation of reports and election of officers, comes on May 9.

Developments in Wireless Telephony

At their weekly luncheon on Friday, February 7th, the members of the Electric Club of Toronto were highly honored in the presence of a distinguished guest, Dr. F. B. Jewett, chief engineer of the Western Electric Company, New York, and Director of Research of the American Telephone and Telegraph Company, who told them, in the clearest and most concise way possible, of the development of wireless telephony, which in an almost incredibly short space of time has grown from a "crazy idea" to an accomplished fact. Dr. Jewett, as pointed out by the chairman, had not intended to come to Toronto until Saturday, when he was to address the Royal Canadian Institute on "Industrial Research," but made his visit a day earlier in order to address the Electric Club.

Dr. Jewett began his address by giving a short history of the wireless telephone. Apparatus for this had probably been considered from almost the start of wireless communication of any kind, he said, for if you could provide the facilities for one human being to talk to another and eliminate intermediary operators, you greatly increased its utility. In the early days it seemed almost impossible to do anything with radio telephony, because the spark system only was known, by which system with a sudden impulse you produce a train of waves with big spaces between them. This did not lend itself to speech because the continuous nature of telephone communication entailed continuous wave train type of transmission. Some years after this latter system was pretty well developed, experiments in telephony had been tried out in England, Italy and the United States, but with little success, because at that time it was impossible to control by means of the voice the enormous amount of energy required on the antennae. Some years ago, back in 1913 and 1914, the American Telephone and Telegraph Company, in connection with the development of their transcontinental line, were looking for and found an amplifying apparatus now commonly called the vacuum tube. Some research work done in experimenting with this device indicated the possibility of making use of a modified form of the apparatus for radio telephony. It seemed that it not only possessed the requisite properties for generating the continuous wave of radio frequency and of putting the voice frequency on this, but also could amplify it up to sufficient horsepower for long distance transmission. The result was that in the latter part of 1914, his company set up a radio station on Long Island and in the early part of 1915 they actually telephoned from there to the Dupont Building at Wilmington, Del. They also introduced wire lines in the circuit, talking from New York to Long Island over the telephone lines, where connection was made with the radio and the conversation transmitted to Wilmington by wireless and then again transferred to the wires and transmitted back to New York. A radio station was also put up at Brunswick, Ga., and conversation carried on in a similar circuit, partly over lines and partly by radio.

Talked With Paris in 1915

The experimenters were then convinced that it was possible to transmit conversations by radio over very great distances and in the latter part of 1915 they talked from Arlington Naval Station in Washington to Panama, to San Francisco, to Honolulu, and later to the Eiffel Tower in Paris. In all of these conversations wire lines formed part of the circuit at the terminal station

All this work was done partly for scientific reasons and partly for the purpose of ascertaining the commercial feasibility of wireless telephony. It was, however, to prove of very considerable value in war work. Immediately after these experiments the United States navy saw the possibility of using the radio telephone for certain short range service and from then on energies were devoted to the short-range type of set—from ten to fifteen up to two hundred miles. This, it was seen, could be used to advantage in a naval squadron, enabling the commander to talk to the accompanying vessels without the use of signals.

Dr. Jewett told how General Squier called him to Washington in 1917 at the beginning of the war to have a conference with the British liaison officer on aeroplane service. It was pointed out that the wireless telephone was of particular interest at that time, the problem being to communicate between the various planes of a squadron and between the ground and the aeroplane. The work done up to that time was sufficient for Dr. Jewett to give assurance that this was a reasonable possibility, and in July of the same year they actually had a squadron of aeroplanes in the air with crude wireless equipment and in November, with finished forms of equipment. This same sort of development was at the same time going on very actively in England and also to some extent in France, but he thought the greatest progress had probably been made on this continent.

The principal problem was the actual use of the telephone on the aeroplane on account of the noise of the engine and the wind. What was practically the greatest difficulty was the design of a transmitter and receiver and a form of mounting and helmet which would enable a man to talk to another man in the same aeroplane. Finally a device was produced by which a man could talk in an ordinary tone of voice with his mate in the same plane, and could also talk with a man in another plane or on the ground by simply throwing a switch. In training, it was possible for the instructor on the ground to advise the men up above what they should do.

Instant Control of Battleships

The navy then came along and said that the tactics of submarine chasing were such that the wireless telephone was just the thing required in the squadrons used for that purpose. As a result, after a certain date, all the submarine chasers that left the United States were equipped with radio telephones with a range of ten or fifteen miles. The equipment was placed on the bridge, so that the commander could talk to any other boat in the line. Neither was it necessary for those receiving the message to hold receivers to their ears as the receiving apparatus shouted out the words in a loud voice. The speaker himself had accompanied a squadron of chasers to see how the system worked out, and it was really wonderful to note the quick response to a command. When the captain decided to stop, he gave the order in an ordinary tone of voice and in anywhere from 30 to 40 seconds every boat, some of them miles away, had been stopped. The result was that a squadron of chasers was put in the same position as an officer and a squad of men.

Dr. Jewett said that the radio telephone had probably played a greater part on the boats than on the areoplanes. He did not think any great quantity of equipment got over to France in time to be of much use on the latter.

Aside from the designing of the apparatus the principal difficulty was in the manufacture of vacuum tubes—a very important and very complicated part of the device. From November or December, 1917, when it was finally decided that the wireless telephone was good military material, the production of these vaccum tubes, which had previously been purely a laboratory product, rose from two or three hundred a week up to 30,000 a week at the time of the signing of the armistice, the manufacture of the apparatus having been entirely commercialized in that period. The need in such great quantity was due to the fragility of the tubes and also the fact that they are short-lived, particularly if handled carelessly by the operators.

Dr. Jewett then proceeded to explain the fundamental principle of the radio telephone. The human voice makes use of a certain range of frequencies, which has been found by experiment to be from 200 per second to 2,500 per second. Actually there are some overtones which run up above that, but for practical purposes this is the range the telephone is designed for. The radio frequencies are up in the hundreds of thousands or the millions. For the short-range type of apparatus, the frequencies are measured by the millions. The problem then was in some way or other to impress on the high frequency carriers the voice frequencies and when they got to the distant end to catch them on antennae, sift out the high from the low and bring the latter to a reasonable amount so that they could be heard. The whole thing is done by the vacuum tube. In one tube at one end there is electrical resonance at high frequency, which with a low voice frequency is fed into another tube where the two are mixed together. In this second tube the impressed voice frequency tends to chop off tops of the high frequency. The whole is then passed through an amplifier and passes out on the antennae at about 10 h.p. At the distant end it is run through a demodulating or detecting circuit which takes out the high frequencies and the low frequencies are carried into a telepone receiver.

One other problem in connection with the use of the radio telephone on the aeroplane was the question of the source of supply of the electrical energy for the radio apparatus. There were three methods of getting the power. One was to hook up a dynamo to the main power plant of the aeroplane; another was to carry along a storage battery, as large as possible, and with a life as long as might be needed; and the third was to use a little wind-driven generator, fastened to the aeroplane and furnished with a propellor. The first plan was abandoned because the aviator did not care to have any attachments to his engine and furthermore, the engine would not always run at the same speed and might be cut off altogether just at the moment when it was necessary to telephone. The storage battery was not favorably looked upon because of its weight and relatively short life, and also on account of the shortage of shipping for conveying them to the points where they might be needed. So they were forced to the wind-driven generator. The requirements put up were these—that the telephone should transmit satisfactorily and at maximum range whether the machine was climbing at the steepest angle, or nose-diving with engine on. It was actually found that the wind-driven generator had to operate with a speed varying from 400 to 14,000 revolutions of the propeller per minute. The solution of this problem again was a vacuum tube. The generator armature had two windings, one to give about 30 volts for the filaments of the radio set and the other to give about 300 volts for the plate circuits. There were two shunt field windings—the main one was in series with the filament of the regulating vacuum tube and the field current was sufficient to heat the filament and cause it to give off electrons, the other was differentially wound with respect to the first and was in series with plate and filament. If the machine increased speed, more current tended to flow through the field and heated the filament up. The hotter it got, the more electrons were given off, providing more current for the differential circuit. Finally they got a machine that would keep the voltage constant within about 10 per cent. over this range of speed variation.

In our issue of April 15th it was stated that an effort was being made by the Ottawa city council to acquire the light and gas plants of the Ottawa Electric Company. We are advised on competent authority that this is not the case.

Growth of Profit Sharing Idea

In a discussion of the advantages and disadvantages of various profit-sharing schemes, outlined in a recent issue of their Sales Service Magazine by the Society for Electrical Development, a list of electrical companies in the United States coming under this category is given. It is an interesting variety, as follows:

A Brief Mention of Plans in Actual Operation

A Western jobber has for several years operated a profit sharing plan, the terms of which can be so simply stated that every stockholder and employe understands them perfectly. From the year's earnings there is first set aside 8 per cent. on the capital investment, to be paid to the stockholders. In addition, two per cent. is set aside as a reserve fund. All profits remaining above the foregoing 10 per cent. are then divided "50-50" between stockholders and employes. The half going to the stockholders is divided in the proportion of their holdings. The half going to the employes is divided first into two equal parts. The first part is distributed among employes on the basis of each individual's annual salary in proportion to the total salary roll of all employes (not including the officers of the company, who take no part in the profit sharing except as stockholders). The second part of the employe's share is divided among them in proportion to the time of service of each to the total time of all employes participating. Only employes who have served the company one year or more participate in the profit sharing plan.

The California Edison Company has in operation a profit sharing plan whereby approximately 900 of its officers and employes are availing themselves of the following plan for securing shares of the common stock of the company. Each officer or employe is permitted to subscribe for shares of the par value equal to not more than ten times his monthly salary. That is to say, an employe receiving $200 per month could subscribe for twenty shares of the par value of $100 or $2,000 of the stock. These subscriptions are paid for by deductions from monthly pay checks of a sum equal to 7½ per cent. of the past month's salary, and credited to the purchase price of the stock. Subscribers are also credited with all dividends which accrue on their stock from the date of the original subscription. Profit sharers have the privilege of paying as much more than 7½ per cent. of their salaries monthly as they desire. For those receiving one hundred dollars or less per month an alternate plan has been provided permitting them to pay for their shares at the rate of $1.00 per share per month.

The Consolidated Gas Company and the New York Edison Co., and their affiliated gas and electric companies, including those in Yonkers, Westchester, Northern Westchester, Queens and the Bronx have adopted a profit sharing plan.

The General Electric Company of Schenectady, N.Y., announced some time ago that with the exception of directors and executive officers, all employes who have been in the service of the company for five years or more will receive in two installments, a bonus equal to 5 per cent. of their annual wages.

Mr. R. W. Rollins, of the Worcester (Mass.) Electric Light Company, speaking at a recent convention of electrical interests at Boston, said that during the five years prior to 1916, employes had received 2.5 per cent. bonus on their salaries, while last year they received 5 per cent.

Mr. Riddell, of the Greenfield and Turners Falls Companies spoke of the excellent results accruing from the holding by employes of an issue of stock, specially designed for them. Since the movement started, a marked improvement in their interest in the work of the company has been noted. The stock is sold at par and draws 6 per cent.

The City Light and Traction Company, Sedalia, Mo., is offering a bonus to the employes of the Broadway electric plant for reducing the coal consumption less than 6½ lbs. of coal per kilowatt-hour, the employes receiving 25 per cent. of the cost of the coal saved on that basis.

The Manila (P. I.) Electric Railway and Light Co. inaugurated a bonus plan in 1915, whereby employes of the power plant receive a bonus upon all savings in the use of coal effected in accordance with the stipulations. Reports are that the plan is working successfully.

The Alabama Power Company, of Birmingham, Ala., at Christmas time gave a bonus of 2½ per cent of the year's salary or wages of all the employes who had been with the company one year or more.

The United States Steel Company, Westinghouse Co., Henry L. Doherty Co., Union Electric Light and Power Co., Mahoning & Shenango Ry. & Lt. Co., Ridgeway Electric Light Co., and many others too numerous to mention use one or another of the plans that have been outlined.

New Emergency Bus Feature in Brantford Hydro-Electric Station

Realizing that some method of oil-switch examination and protection was necessary in the various hydro stations, Mr. W. R. Catton, manager of the Brantford Hydro-electric System, has designed and installed a switching system of which photographs and drawings are herewith shown. The schematic drawing of the connections is shown in Figure 1, the lower left hand bus being the regular operating bus, the transformer bus to the right hand side being connected to series and voltage transformers to either bus as desired by means of disconnecting an oil switch. In this way, using the connection, as shown in Fig. 1, the totalizing of the load is taken care of no matter which way the current may be fed. The auxiliary bus is the top bus shown on Fig. 1.

The scheme contemplates the use of double-throw single-pole disconnecting switches, which are mounted on top of the board with barriers between, three disconnecting switches being used to each circuit. The circuits being properly marked with red, white and blue bands about one inch wide on the switch blade itself. The main bus is painted red, white and blue giving the same designation and circuits. It is to be noted that the double throw disconnecting switches are so arranged that the blades can be thrown separately, this being so that the circuit can be connected up without interrupting. Careful phasing-out having been done, this paralleling of the auxiliary bus and the main bus can be done with safety. The scheme, as a whole, acts in a similar way to a loop line off boiler pipes, between the boiler and engine, with suitable valves, which compare with the oil switches and disconnecting switches on the electric system.

The ordinary procedure of changing over any one or all of the circuits to the auxiliary bus is to throw the disconnecting switches up on the upper set of bus bars, closing the oil switch which feeds the auxiliary bus with a proper setting to take care of the load to be taken care of, (description of which will be given later), pulling out the lower set of disconnects and the middle set of disconnects on the double throw disconnecting switches. This clears the oil switch on this particular panel entirely and any work can be done upon this panel as desired, in the way of work on the instruments, oil switch or series or voltage transformers, the load being entirely fed through the auxiliary bus for the time being. Circuits are opened and closed with oil switches only.

Previous to the installation of this equipment, the oil switches or their parts could not be repaired without an interruption, and the oil switch, necessarily, had been neglected and the oil probably had not been renewed as often as would be, if it were convenient to get at the oil switch. Mr. Catton points out the advantages he has already found in his switching system, which has only been operation some two to three weeks, namely. First: To kill any phase on lighting feeders, which is a 4,000 volt Y system; second: to kill any oil switch and make repairs on switchboard; third: the paralleling of the feeder with the emergency bus before killing the equipment, thus preventing any interruption or stoppage of motors on the particular feeder which is to be thrown over onto the auxiliary bus; fourth: on Sunday when the load is down to a minimum, complete feeders can be operated on the emergency bus and the entire switching equipment killed with an opportunity to overhaul bus or repair any parts that are required on the switchboard, the operator being able to work with perfect safety on any part of the board. This is shown in photo, Fig 3, below top row of disconnecting switches.

The transformer oil switches are not at present protected by such a system, but could be easily protected, and probably will be later, and equipped with a similar system so that the oil switches can be repaired on the transformer bank if necessary. These switches, however, do not operate as much and would not therefore require as much care and attention in the way of repairs.

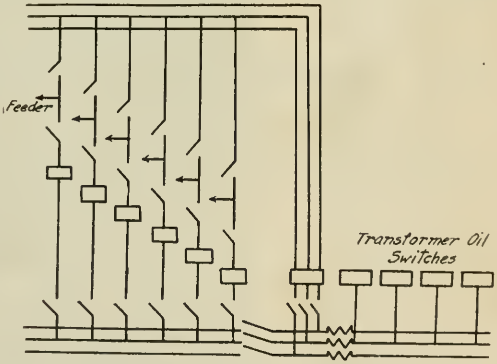


Fig. 1.—Wiring Connection Diagram

The question of the setting of the auxiliary panel for operating the emergency bus is worked out with the simple collective revolving switch, which is connected with the series transformer in such a way that the settings are approximately 20 amperes to 120 amperes up to 200 amperes by steps of approximately 20 amperes per step as arranged for. Any feeder can be put on the busbars and amply protected by setting equivalent to the load to be carried. This is arranged so that the trip on the oil switch which operates this panel is connected with the series transformers to the collective revolving switch.

The auxiliary panel for operating the emergency bus is arranged with a high and low reading ammeter to get close readings throughout the scale and as stated above, the trip coil and relays are all arranged to be operated with the collector revolving switch, which connects the secondaries of the two transformers of various taps brought out in a position which gives various settings for various types of load.

The operation of transferring the feeder to the emergency bus will be the closing of the top disconnecting switches to each phase of the particular feeder selected to be closed, the setting of the auxiliary bus bar switch to the proper value of the circuit or circuits to be connected, the closing of the emergency or auxiliary bus oil switch and the disconnecting of the lower double throw disconnects and the single pole disconnects below it, the three phases of each, of course, being disconnected.

In transferring the whole station the setting on the auxiliary bus rotating switch will be kept to the highest value. This means you have the protection on any load up to the capacity of the oil switch, which is 200 amperes and 4,000 volts star connection, grounded neutral.

The layout of the above equipment was designed by Mr. Catton and the equipment was furnished by the Canadian Westinghouse Company. It will be readily seen from the photographs shown herewith that this outfit makes a neat and safe arrangement, as all the disconnecting switches are out of reach, being at least 7 ft. 6 in. to the bottom of the first floor of disconnecting switches. The same equipment in a modified form has been put in at the Windsor Hydro-electric station by Mr. O. M. Perry, manager of that plant and the Walkerville system of which Mr. McHenry is manager contemplates its use. It is predicted that many of the other stations will avail themselves of Mr. Catton's ingenious scheme to take care of their local conditions.

Lower Rates in Canada

Apropos of the low rates charged in various parts of Canada for domestic purposes and more particularly throughout the Hydro area of the province of Ontario, it is interesting to compare figures in the United States, recapitulated in a recent article in the Monthly Sales Service of the Society for Electrical Development. This article shows that there are 4,573 towns or cities in the United States where a rate of five cents or less is charged for electric heating and cooking. Of this total, however, only four give a rate as low as 1 cent; three give 1½ cents: forty-five give 2 cents, and the remaining 4,521 are higher than 2 cents. The most general rate is 3 cents, which prevails in 780 towns.

The employees of the Bell Telephone Co. in Montreal have formed a society under the name of the Telephone Association of Montreal, of which Mr. McMahon is president. It has three main objects, dealing with education, the social side, and sports. The programme includes lectures and smoking concerts. The membership is free. A recent concert was attended by the president and all the principal officials, in addition to many employees from outside points. During the evening the MacFarlane Cup, the trophy of the Bowling League, was presented to the contract team.

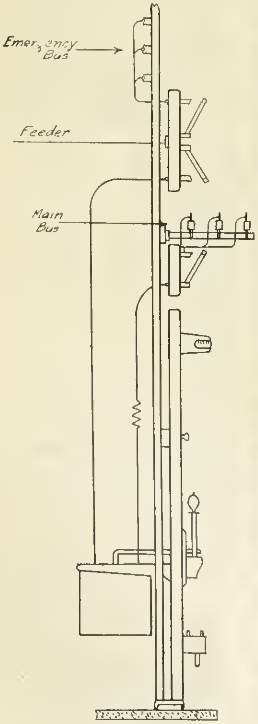


Fig. 2.—Section of Board

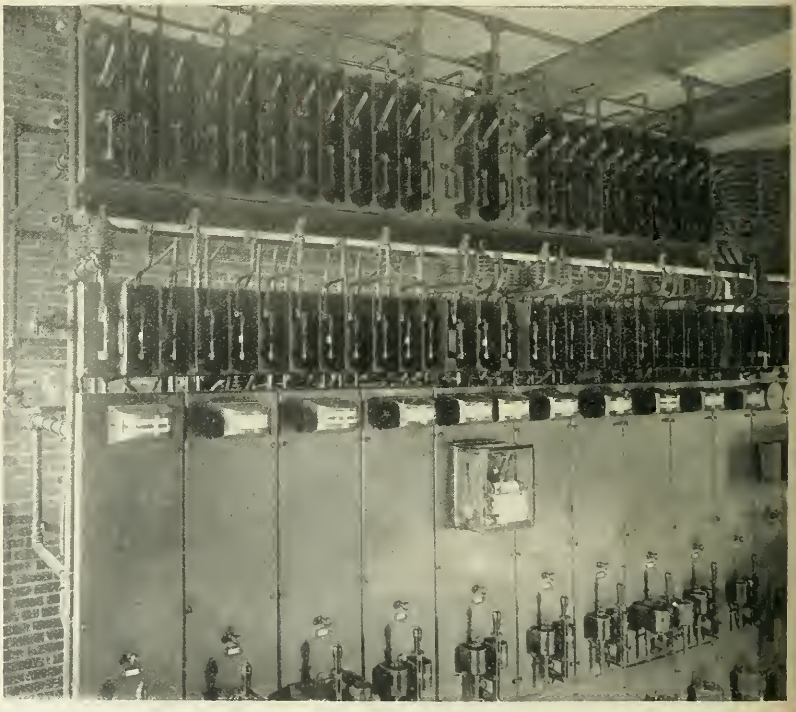


Fig. 3.—Board as now installed by Mr. Catton in the Brantford Station

The Tungar Rectifier—Its Theory, Characteristics and Applications

By Mr. F. Keith D'Alton

Unindirectional currents are obtainable from alternating currents by three well known methods, namely, regeneration, conversion and rectification.

The first of these methods makes use of a motor-generator set whereby the energy supplied by alternating current to the motor is first entirely turned into mechanical energy and then again transformed into electrical energy and delivered as direct current from a commutating generator.

Under the heading of "Conversion" we consider the action of the rotary converter where electrical energy is in part (a very small part) turned into mechanical energy to keep the armature revolving, but principally the energy is turned from alternating current to direct current by the magnetic relations in the machine and the commutator on the d. c. end.

"Rectification" differs from both of the above in that no part of the energy supplied is transformed into mechanical energy. The rectifier controls the alternating current in such a manner that the current permitted to flow through the rectifier is in one direction only. This is accomplished by either the complete stoppage, or the reversal in direction, of such part of the alternating current as would flow in the opposite direction to that desired.

By "unindirectional currents" we naturally refer to currents flowing in the one direction. The several methods, by which alternating currents give these non-reversing currents, differ, not only in method, but in result as well, and in application.

The rectified current, as will be seen later, may be used for the majority of the purposes to which generated direct current may be applied. The rectified current is usually pulsating; there are a few cases, therefore, where it does not give satisfactory results, one example being the calibration of electrical instruments.

In the following paragraphs, a comparatively new type of rectifier will be described, ie., the Tungar rectifier. This novel little device will be considered in regard to the theory upon which it is built, the various connections in which several may be linked together with the advantages of each arrangement, and the many purposes to which the single rectifier, and also groups of rectifiers, may be applied.

In addition, the electrical characteristics are illustrated by graphs and the behaviour of the rectifier is clearly shown by the numerous oscillograms which form part of this description.

The Principle of the Tungar Bulb

For many years, scientists were satisfied with the well known "molecular theory" as basis for explanation of all that was happening in the material world. Recent research work, however, has found many strange phenomena which this molecular theory was not able to explain. The electron theory, based on the molecular theory, goes deeper than the latter, and states that all atoms contain charged particles, some positively charged, some negatively charged, and that a current of electricity is merely a movement of these particles along a conductor or through an electrolyte.

The negatively charged particle is termed the "Electron." Some very strange phenomena, observed in laboratory experiments, are easily explainable by this "Electron Theory," and it is upon this theory that the Tungar rectifier is constructed.

When a metal is heated to incandescence in a fairly good vacuum, there is an emission from the metal of minute material particles each carrying a negative charge of electricity, ie. electrons.

As the law of attraction and repulsion between charged particles is that unlike charges attract while like charges repel, it may readily be expected that any positively charged body in the neighborhood will attract to itself these negatively charger particles. The result then is that we have a passage of electrons from one body through space to the other body. These electrons are charge-carriers; a flow of electrons is therefore, a flow of charges, ie., a current of electricity. Hereinafter, unless stated to be otherwise, the word "current" refers to this current above described.

Consider now, the Tungar bulb, part of the Tungar rectifier, as illustrated in Fig 1. The hot metal is a tungsten filament, designed and arranged to be heated by the passage through it of an electric current from some source, (either d. c. or a. c.) the purpose of this current being for heating only. Above the filament and close to it, is placed another body, not heated; this, in these bulbs, is a graphite button.

The filament is now heated and emits electrons; the graphite button is charged positively with regard to the filament. Hence a flow of electrons, (negative charge carriers) takes place from the filament to the graphite and around through the circuit outside connecting these electrodes.

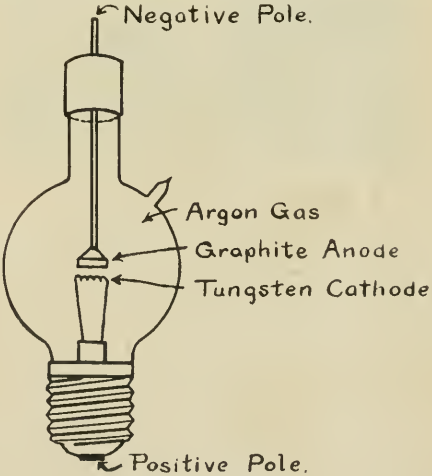


Fig. 1—The Tungar Bulb

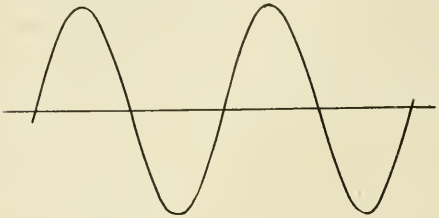
Electrical engineers have a certain system of signs for the direction of flow of current and, according to these, a current flowing in a given direction is said to be a "positive" current. The opposite direction of flow is called "negative."

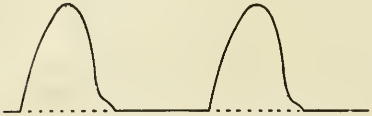
Now, in the tube we have a negative current flowing from filament to graphite block. According to our conventional terms we state the condition as being positive current flowing from graphite block to filament inside the bulb.

Therefore, we consider the current to flow in at the top of the bulb, (negative pole) to the graphite (anode) and across the gap to the filament, (cathode) then out by the base, (positive pole) and around the circuit, and in again at the negative pole.

The graphite is comparatively cold; it does not emit any electrons, even if the polarity of the charges be reversed, and therefore there can be no reverse flow of current.

Increasing the relative difference in charge between the anode and cathode will permit a greater flow of electrons and therefore a rectified current of greater magnitude. This relative difference of charge is controlled by varying the outside source of voltage that is used to propel current around the circuit.





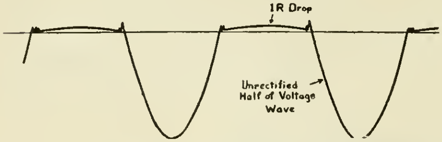


Fig 2 (above)—The Sine Wave—Alternating Voltage

Fig 3.—Rectified Current Wave.—No load. "One Half Wave Rectification"

Fig. 4 (Below)—Potential Drop across the Bulb—Full Load Half Wave Current Flowing

The temperature of the filament sets an ultimate limit for the value of this current from anode to cathode.

For a fixed temperature of the filament, the flow of current will vary with the applied voltage, but with a fixed applied voltage the flow will vary with the temperature, up to a certain point only after which increase in temperature does not cause increase in current flow.

The above statements apply in a circuit where the resistance, external to the bulb, is negligible, for otherwise Ohm's law applies and the current is also inversely proportional to the resistance.

It will be observed in Fig. 1 that the tube is not a vacuum but is filled with argon gas. These electron emissions will occur in a vacuum, as is shown in the working principle of the kenetron, but in the Tungar rectifier the working voltage is low and it has been found that the current flow is much increased by the presence of argon when the filament is of tungsten.

The argon gas used is purified by a specially prepared agent, the composition of which is still a secret with the manufacturer. This purifying agent is introduced into the bulb at the time of manufacture and evaporates when the bulb is first put into service. In evaporating it deposits itself on the inner surface of the bulb causing a dark discoloration. It is only in the matter of appearance that this discoloration is objectionable.

Presence of air very materially impedes the current flow, and a very minute quantity of air, or pure oxygen, causes the tube to emit a delicate purple light when under load.

Now we have spoken, at length, of the theory of the Tungar bulb. There is one more point to bring to the reader's attention, namely, that an alternating voltage applied between the graphite button and filament, can produce only a unidirectional current in the circuit, as current passes only when the filament is cathode and the graphite block anode, and not vice versa.

As we have stated already, the current is proportional to the voltage applied when the temperature of the filament is constant. Consequently, when rectifying a sine wave, we are not surprised to find that the rectified waves of voltage and current have about the same shape as the half sine wave.

Characteristics of the Bulb

In Fig. 2 we have a pure sine wave of alternating voltage which we apply between cathode and anode and we have then a current flowing as shown in Fig. 3. Half of the wave is completely blocked, the active half being reproduced fairly accurately in the current.

Now Fig. 4 is the potential drop across the bulb when voltage of Fig. 2 is applied and the current of Fig. 3 flowing. Naturally during the half cycle that no current flows, the potential drop across the bulb itself will be the same as the voltage applied, but during the half cycle in which current flows, the drop will be that due to the current flowing through the resistance of the bulb. It is seen to be only a small part of the applied voltage and is lettered "IR Drop."

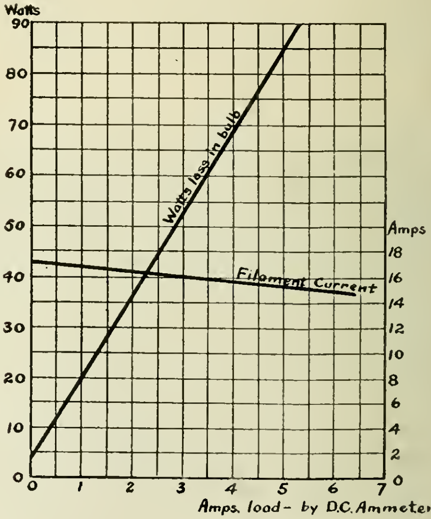


Fig. 5—Characteristics of Bulb, Watts loss and filament current, varying load.

Judging by the oscillograms we might be inclined to think that the drop varied as the current (roughly) and that the resistance of the bulb was constant, but we find that the watts loss in the bulb, varies as the load current, Fig 5 signifying a gradually reducing resistance as the load increases.

The filament current decreases here as the load inrceases this being due to the connections used but not seriously affecting the watts loss curve.

In Fig. 6 we see another characteristic of the bulb, namely, with constant loads the loss in the tube reduces as the filament current, and consequently the temperature, is increased. This effect is much more marked at the low loads.

(It will be observed that load currents are being measured by d. c. instruments. The a. c. and d. c. instruments read different averages of the current or voltage waves, hence one or other must be used and definitely stated, as is explained more fully later.)

One very strange effect noticed when the load is in excess of one ampere (on the 6 ampere bulb) is that the filament heating current is necessary for starting only and may be turned off after the tube is started without affecting the load current in magnitude or wave form.

Under normal conditions, with filament current flowing, the filament is uniformly bright throughout its length but when the filament current is turned off, the electron emission is localized at one end of the filament. This, without doubt, will cause the filament to wear away more rapidly.

The Tungar Rectifier as Placed on the Market

To the General Electric Co. of Schenectady, N. Y., belongs the credit for the development of the Tungar rectifier. It is the result of research in their laboratories.

A very practical rectifier has been designed and is sold complete, and ready for attachment to a lamp socket, primarily for the purpose of charging storage batteries.

The rectifier consists of a small transformer, a rectifying bulb, and socket for its support, and the necessary fuses to protect the circuits.

These transformers are designed for different voltages and for different frequencies, but principally for 115 volts, and 25 and 60 cycles.

The bulb itself is made of glass, about 3 inches in diameter and is designed to fit a mogul socket thus facilitating an interchange of bulbs. The mogul base is used in place of the Edison standard base since the current to be handled is chiefly the filament current which is more than can be safely carried through a standard Edison socket.

As all bulbs are tested before being shipped, the purifying agent has already done its work when the bulb is sold. Hence a new bulb has much the same appearance as a worn out tungsten or carbon lamp, but this discoloration does not affect the operation of the tube unless the deposit be excessively thick, in which case the bulb will overheat and may have a short life.

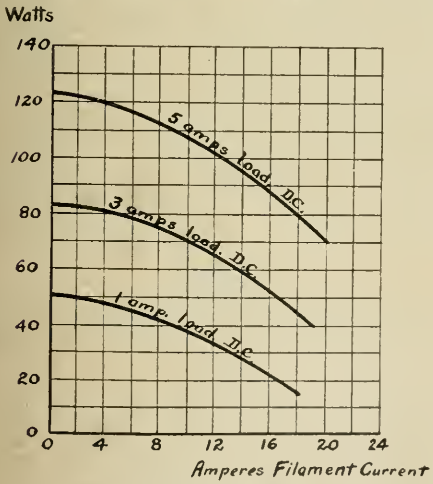
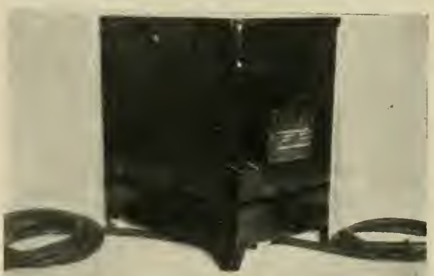


Fig. 6.—Characteristics of Bulb. Losses, with constant load currents, but varying filament current

The life of a bulb varies from six hundred to three thousand hours. Some bulbs, however, have been known to give over eighteen months of nearly continuous service. The failure always accurs in the filaments, and in order to give the bulb a long life the filament is made particularly rugged. Furthermore, there are several designs for different current capacities as follows:

1. The 2-ampere unit, which when operating on 115 volts a.c. (single phase) will charge three cells at 2 amperes, six cells at about 1 ampere, and eight cells at about 0.75 ampere.
2. The 6-ampere, 7.5/15 volt unit is for charging either three or six cells of lead battery at 6 amperes when operated on 115 volts a.c. (single phase).
3. The 6-ampere, 7.5/75 volt unit is for charging from three to thirty cells of lead plate battery at from one to six amperes.

As it is evident that No. 2 size of rectifier will be the size of most interest to automobile owners and, in fact, to the majority of people using storage batteries where they desire to charge the cells themselves, we will hereinafter confine our statements to this size, as designed for 115 volts, 25 cycle, realizing at the same time that what is said regarding a 25 cycle rectifier applies equally well to a 60 cycle rectifier since frequency does not in any way influence the characteristics of the rectifying bulbs themselves and need only be taken into account in the auto-transformers supplied as part of the rectifier.



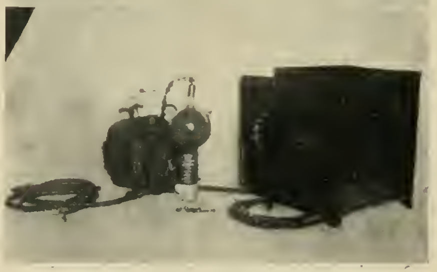


Fig. 7 (above)—The Tungar rectifier in metal box.
Fig. 8 (Below)—The Disassembled Rectifier.

Fig. 7 shows the rectifier (No. 2 size, 25 cycle) as supplied by the General Electric Co. Fig. 8 shows the disassembled parts of the same rectifier, giving their relative size. Fig. 9 is the small auto-transformer alone, while Fig. 10 shows two bulbs of the same size. The dark discoloration already referred to may be observed in the dark bulbs in this photograph.

Form Factor

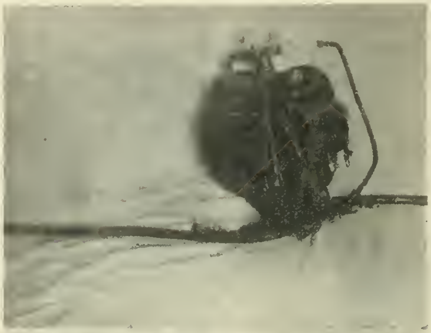
A few words in regard to "Form Factor" is stated here, may pave the way for a clearer understanding of and greater appreciation of the value of the different connections to be described.

An alternating current instrument (moving vane type) and a direct current instrument (permanent magnet type) will give the same indication on a smooth uniform direct current, but if the current be pulsating the indication of the a.c. instrument will be higher than that of the d.c. instrument.

The a.c. instrument reads the root-mean-square value of the wave whereas the direct current instrument reads the simple average. The ratio of a.c. instrument reading to the d.c. instrument reading is called the "Form Factor" of the wave.

$$\text{Form Factor} = \frac{\text{A.C. instrument reading}}{\text{D.C. instrument reading}} = \frac{\text{root-mean-square}}{\text{average}}$$

Obviously, the form factor of a direct current is 1.00. Form factor can never be less than unity, and consequently the lower the form factor (the nearer it is to unity) the nearest is the approach to a smooth direct current.



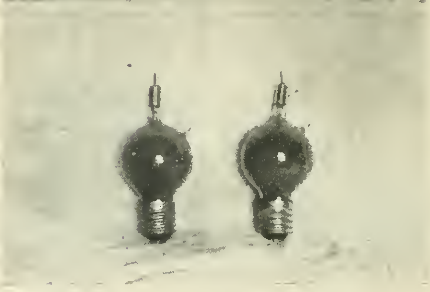


Fig. 9 (above)—The Auto Transformer.
Fig. 10 (Below)—Two 6 amp. 7.5 15 volt Tungar bulbs, showing discoloration due to purifying agent

The form factor of a half sine wave, ie. a half wave of sine form with only one half wave per cycle is 1.575.

If currents be considered, then the r.m.s. value is the heating value, whereas the average value is the effective value in charging or discharging a cell. Since it was chiefly for this work of charging cells that the Tungar rectifier was originally designed, we think it best to use d.c. instruments for measuring the rectified currents, thereby reading directly the charging value of the current.

(Continued in May 15 issue)

The Hamilton retail merchants are holding a "Retailers' Week" in that city during the week April 29-May 2. The evening of May 2 has been designated Ladies' Night and, being the special event of the week, the Hamilton District Electrical Association have been asked to provide the entertainment.

The Winnipeg Light and Power Department have arranged to purchase property on Scotland Avenue for the erection of a sub-station.

British Aluminium in New Quarters

Owing to the greatly increasing business of the British Aluminium Company and to their policy of carrying a stock of nearly 100 tons aluminium for the benefit of their Canadian customers, they have removed to larger and more convenient office and warehouse premises. The new Canadian headquarters of the company is now at the Purman Building, 265 Adelaide Street, West, Toronto. The office, warehouse and stock rooms are very large and well appointed, having a frontage of nearly 100 feet on Adelaide street, and anyone interested in aluminium will find it time well spent to pay a visit to these premises where a permanent exhibition of the different applications of the metal is always on view. In addition to this extension the company is endeavoring to take care of its increasing business by augmenting its staff in the Toronto office and a well known expert in aluminium, Mr. E. T. Driver, B. Sc., will shortly take up the position of technical adviser.

The war has been the greatest advertisement, perhaps, that aluminium ever had. To meet the many varying conditions of service new and intensive means of production have been devised and in one particular direction, viz. the production of new alloys, the knowledge gained in the last four years has been more than was ever known about aluminium alloys before.

Business in general is rapidly adjusting itself to the conditions of peace and aluminium is every day in stronger demand for the manufacture of kitchen utensils and specialties, the construction of automobile bodies and parts, and for wire and cable and other uses in the electrical field.

Personals

Mr. Wm. C. Brown, of the New Brunswick Power Company, St. John, N. B., has resigned to go with the Canadian General Electric Company.

Mr. H. M. Miller has been appointed Hydro engineer at Carleton Place, Ont., extension. Mr. Miller was formerly superintendent at St. Marys, Ont.

Mr. W. G. Murrin, assistant general manager B.C.E.R. Company, has just returned from a nine weeks' vacation in California where he went for the benefit of his health.

Mr. J. A. Anderson, who was for 32 years with the Bell Telephone Co., Montreal, and was formerly superintendent of traffic, has resigned. He has started in business at 85 Cathcart St., Montreal, as electrical contractor and supplies.

Obituary

John Lennox, a well known Hamilton, Ont., business man, was accidentally drowned on Wednesday, April 24th. He had often spoken of the fact that he was Hamilton's first street car conductor.

D. B. Detwiler, a native of Waterloo county and a prominent Kitchener manufacturer, died on April 18, after an illness of about six months. He was president of the Algoma Power Company and was a prominent member of Kitchener Electric Light Commission, having been a strong supporter of Hydro since its earliest days.

Reflectors—The Harvey Hubbell Company of Canada have issued a folder illustrating a number of types "merely to convey an idea of the variety of the Hubbell line." The regular catalogue of this company, No. 16, lists and illustrates over 200 different shapes and sizes.

The 1919 Convention of the Illuminating Engineering Society will be held in Chicago, Illinois, early in October. Details will be announced as soon as definite plans are formulated.

The Contractor-Dealer

Standard Accounting System for Contractors and Dealers

Realizing that the business of the electrical contractor-dealer, with regard to the merchandising of material, required improved cost and accounting methods, The National Association of Electrical Contractors and Dealers, in 1917, appointed a committee to consider this subject. The various associations and societies in the electrical industry were called in to co-operate in devising a system of accounting to cover the present and future needs of the electrical contractor and dealer.

This system has now been approved and endorsed by the National Electrical Credit Association, the Accounting Committee of the Electrical Supply Jobbers' Assn., the Accounting Committee of the Associated Manufacturers of Electrical Supplies and the Society for Electrical Development and has been formally ratified and adopted by the Executive Committee of the National Association of Electrical Contractors and Dealers.

This system conforms generally with the accounting systems of the various electrical manufacturers' associations and the Electrical Supply Jobbers' Association, so that accounting information furnished by the various branches of the industry will be uniform and comparative, and enable the electrical industry to furnish satisfactory and comparative information to any governmental body.

The National Association urges the entire trade to adopt the system described on the following pages, which it is prepared to supply at a cost that is a definite saving to the users.

Cardinal Principles

1. All forms should be standardized.
2. All sales, whether contract, jobbing, day work, or retail, should be costed.
3. A merchandising account should be created through debit entries for purchases and credit entries at cost for materials sold in any way.
4. A general ledger containing all controlling account should be made a part of this system.
5. All liabilities should be vouchered each month irrespective of receipt of goods or correctness of invoice. Provision should be made for charging vendors for any errors or discrepancies in bills.
6. Cash book should combine bank records, both receipts and payments, that, debit entries equalizing bank deposits for the month and credit entries equalizing charges to bank balance. The cash book should not be used for distribution.

Every contractor and dealer intending to follow this system of accounting, at the start should familiarize himself with these cardinal principles, for in order to obtain the best results in the use of the system all members must be in sympathy with these principles.

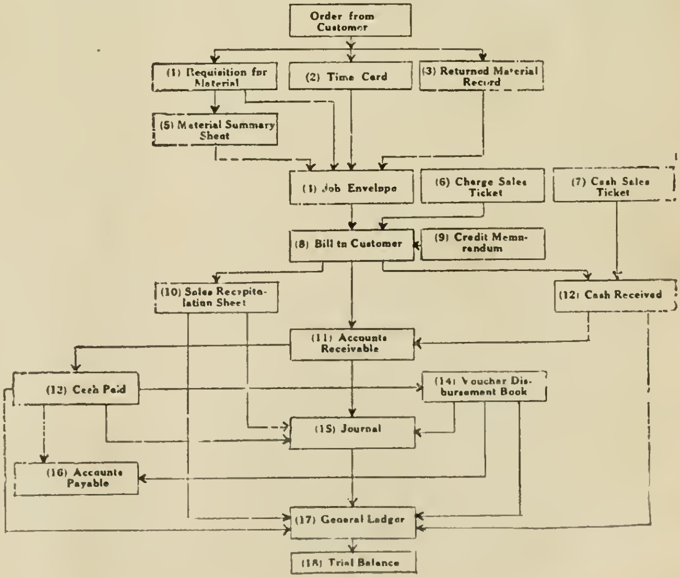
The principles of accounting as laid down by the Accounting Committee of the Association of Electrical Manufacturers' Council (National Electrical Manufacturers' Association) and the Electrical Supply Jobbers' Association have been embodied in this system to the end that the electrical industry may be able to present correct, comprehensive figures as to the results the various branches are obtaining and the difficulties they are encountering, so that in future investigations by the United States Government or Federal Trades Commission the information obtainable will lead to intelligent legislation.

Of the foregoing six cardinal principles, the most important are:

2. All sales, whether contract, jobbing, day work, or retail, should be costed.

Unless the owner of a business is in position at the end of each month to tell the gross profit on his sales and determine the actual profit for the month he is working abso-

How Business Flows Easily through the Accounts in this System



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lutely in the dark, and perhaps on false premises. In order to obtain the knowledge of his gross profits on the various classes of sales each month it is vital that costs be obtained on all contracts and sales. It may appear burdensome to the contractor to obtain costs on his sales, but there is no feature of the accounting end of the work that is so necessary, or that will pay for value received, as that entailed in obtaining costs on all transactions.

3. A merchandise account should be created through debit entries for purchases and credit entries at cost for materials sold in any way.

The users of this system must accept the principle of a running book inventory of their merchandise on hand, not waiting until the end of the year to learn the actual value of the merchandise without any check as to the proper amount the merchandise should equal.

The value of the merchandise on hand each month is obtained through the charge to Merchandise Account of all material purchased plus the material on hand when starting the use of this system; crediting to the account cost of all merchandise sold.

Naturally, some inaccuracies will creep into the costing of sales, but this account at all times should reflect, within 5 per cent., the amount of merchandise on hand, and this should be the basis for regulating the amount of insurance and purchase of material.

5. All liabilities should be vouchered each month irrespective of receipt of goods or correctness of invoice. Provision should be made for charging vendors for any errors or discrepancies in bills.

This principle can not be emphasized too strongly. All liabilities should be vouchered each month irrespective of receipt of goods or correctness of invoice. This is a radical departure from the old time custom of waiting until all questions of receipt of material or correctness of invoice have been adjusted. From a legal standpoint the purchaser is responsible for all material billed by vendor as soon as goods have been placed in the possession of the common carrier, especially as it is now the general practice to ship all material F.O.B. the factory. Adjustment due for any cause may be charged to the vendor's account, but the original charge should be approved for the entire amount, as far as the contractor's liability is concerned.

The system does not advocate the payment of liabilities created, if the factor of readjustment warrants withholding settlement until results can be obtained from debit memorandums to the vendor, but every contractor each month should face his legal obligations as to his liabilities. If this is done every contractor and dealer each month will be able to gauge his financial obligations and make proper provision for payment thereof.

We have dealt rather at length on these principles, as a firm belief in them is necessary for the proper use of this system and the placing of the business of our members on the plane to which we all aspire.

INSTRUCTIONS FOR USE

Section I. Instructions for Opening Books.—Necessary Steps in starting the system

Present books should be closed, the same as at end of any fiscal year, and trial balance obtained, including physical inventory of merchandise, tools and office appliances on hand.

The respective items in the trial balance should then be transferred to the proper accounts designated in the new trial balance sheet furnished, and corresponding accounts opened in the new general ledger in the same sequence as the various accounts appear in the trial balance book.

Care should be exercised in changing your former divisions of asset and liability accounts, also expense account, so that they will agree with the divisions outlined in these instructions, as it is essential that all members have the same viewpoint in the classification of assets and liabilities and those affecting the operation of their business.

With these initial steps the proper trial balance has been obtained, and the general ledger started. Now come the various functions covered by the forms outlined in the key chart. See illustration Fig. 1.

The principal step now to be taken is some arrangement for obtaining the cost on all sales, either contract, day work, or store sales, so that as the work is completed, or the store sales ready to be billed, there will have been obtained the cost, as to merchandise, labor and productive expense, for use in the Sales Recapitulation Sheet. See Form 10.

The use of the various forms will be explained later in these instructions and each step in the completion of the records for the month will follow logically and will be explained as the use of each form is developed.

Section II—The Key Chart

This chart shows the slips, cards, envelope, tickets, bills, sheets and loose leaf pages used in the accounting system. For convenience all of these records are called forms, which, in fact, they are. Names of all forms are given. The lines connecting the forms indicate the sequence of the accounting operations or the way in which business flows through the accounts in the system. The number in each little panel refers to the reproduction and description of the actual form. For example, No. 11 of this chart refers to Form 11 and description of No. 11.

Be sure to study carefully the explanation of the general ledger account, overhead accounts, and how to close the books for the month.

Sec. III.—Forms and Directions

Only eighteen forms are necessary to the operation of this uniform accounting system. They are named in the key chart. These records, it is believed, provide a simple, accurate, and flexible accounting system for the average electrical contractor-dealer. The system is designed to meet the needs of the contractor who does no retailing, the dealer who does no contracting, and the business which includes both contracting and retailing. The contractor and the contractor-dealer will use all the forms, but the dealer who does a retail business exclusively will not need the first five forms. Central station electric shops that are organized on a departmental and profit-making basis, as they should be, will also be able to adapt this system to their needs. The value of a uniform accounting system to the retail trade will, of course, be most largely conserved if those who install the system hold down the variations from it to the smallest possible number.

While the system has been designed particularly to meet the needs of the average contractor-dealer whose present accounting methods are inadequate or unsatisfactory, the system will be found flexible enough to meet the needs of any size of business.

In the following pages the forms are described in the order in which they are numbered in the key chart. A careful inspection of the forms and the chart should make the system clear and easy to install.

Form 1—Requisition for Material

When an order for contracting work has been received from a customer naturally one of the first forms to be made out is a requisition for material. This form is necessary whether the shipment is from stock or from the vendor direct to the job. The form provides for this notation. However, it must be remembered it is an office form and not a purchase requisition. At the same time that a job is opened

FORM 1

Requisition for Material

No.______ Date______
Charge to Job No.______ From Stock ?______ Fram Vendor ?______
Roughing______ Finishing______ Tools______
Name______
Address______

Quantity	Date Delivered	Material	Cost

Remarks
Total
Rec'd by

This requisition for material provides an easy and accurate method of keeping track of all material sent out on a job. Size 5 x 7

FORM 2

Time Card

Date______

I worked to-day as follows:	Job No.	Car Fare	Telephone	Rate	Hours

Signed

A time card should be made as simple as possible in order to obtain accurate necessary information from the workman. Accounting details on labor go to office forms. Size 3¾ x 6½

FORM 3

Returned Material Record

No.______ Date______
Credit to Job No.______
Roughing______ Finishing______ Tools______
Name______
Address______

Quantity	Material	Cost

Remarks
Total
Rec'd by

It is easy to be careless about material not used on a job, if it is not to be lost, and disputes with customers are to be avoided. This form helps to eliminate carelessness. Size 5 x 7

FORM 4

Job Envelope

Job No.______ Date______
Amount of Contract______ Customer's Order No.______
Name______
Address______
Date Billed______ Total Cost______

	Material		Labor			Direct Job Expense		
Req. No.	Amount	Total	Date	Amount	Total	Date	Amount	Total
	Total			Total			Total	

A stout manila envelope which keeps in one place all the material, labor and direct expense data necessary to arrive at the total direct cost of the job. Size 9 x 11.

with this form, the job envelope (No. 4) should also be opened. The requisition for material should be costed each day and filed in the job envelope. If it is necessary to keep a separate stock record, a duplicate will serve this purpose, permitting the original to go into the job envelope. Where material is shipped direct from vendor to job, duplicate or order sent to vendor should be placed in job envelope and costed to take the place of Form 1.

Form 2—Time Card

The time card is to be made out by the workman and turned in by him each day. The card should be filed under the workman's name so that all his cards are already assembled when computing his pay for the week. Before his card is filed, however, a separate card should be made out for each job listed on the workman's card. These cards are then to be filed in their respective job envelopes. The workman may not know the job number, but he certainly knows the name and address. The office or bookkeeper can then fill in the job number.

Number 3—Returned Material Record

Whenever any material is returned from a job one of these forms is to be made out, listing the quantity and kind of material returned. The workman, or whoever checks the returning material, can fill in all of the form excepting the cost column. The form is then turned over to the bookkeeper, who will cost the material and then file the card in the proper job envelope.

Form 4—Job Envelope

This envelope is intended to contain all of the records of material, labor, and direct job expense after costing. As the job progresses all of the information should be entered on this form printed on the front of the envelope. The column headed "Direct Job Expense" is for the entry of such items as "Telephone" and "Car Fare," indicated on the time card, also freight, express and cartage directly applying on this particular job. The sum of material total, labor total, and expense total will give the actual total direct cost of job. To this figure there must be added, of course, a percentage for overhead, and a percentage for profit when billing the customer. The information as to material, labor and direct job expense should be transferred to the duplicate of the customer's bill. The envelope should be filed numerically in the job envelope file.

If desired, the value of merchandise at cost on unbilled work can be obtained by adding the total of merchandise columns on the various job envelopes which have not been billed at the end of each month.

Form 5—Material Summary Sheet

Study this form carefully. It is intended to supply a long-felt need in the electrical contractor's accounting. Its purpose is to assist the contractor in assembling various types of material shipped, especially on day work, that is "time" and "material jobs, so that a condensed billing can be made quickly and accurately on completion of the work.

With this form it is necessary to write down the name of an article only once (unless there are more than five requisitions of it) and against it can be indicated the date, the amount of material issued, the total issued, any return, the total chargeable, the unit cost, the total cost and the selling price. Study the "fill-in" above on the three requisitions of wire and you will see the advantages of the form.

The final figure on material on each requisition is to be entered in the column of the same name on the job envelope, This summary sheet is to be filled in progressively, that is, whenever material goes out on a job.

Form 6—Charge Sales Ticket

No one form has been designed in this system for a charge sales ticket. This ticket will vary according to the use of a cash register, duplicating sales register, or sales book. Whatever kind of ticket is used, provision should be made for obtaining cost on this type of sale.

Form 7—Cash Sales Ticket

No one form is recommended. Explanation and instruction for charge sales ticket holds good for this one, too.

Form 8—Bill to Customer

No one form is recommended. All bills should be made in duplicate. Use plain paper for the duplicate. The bill and duplicate will carry the job number and also a consecutive bill number. The duplicate is to be filed according to the consecutive number in a standard binder, from which postings are made direct to the sales ledger, that is "Accounts Receivable." The number on the duplicate is to be used as the folio number in the sales ledger column. When billing contract work, day work or store sales charged to customers, be sure to record on the duplicate the cost of the transaction, separating material, labor and direct job expense.

Form 9—Credit Memorandum

No one form is recommended. Forms in duplicate should be provided for sending credit memoranda to customers, covering any allowances or adjustments. The duplicates are to be retained in a designated binder. The cost, as to material, labor and direct job expense of such credits is to be duly recorded in the duplicate.

Form 10—Sales Recapitulation Sheet

Progressively during the month the amounts of bills rendered, together with the cost, should be entered on this form which is a recapitulation of amount of sales (i. e., contract sales, and time and material sales) amount of lamp sales, amount of store sales, and the cost of these sales. If you have an adding machine and do not wish to list each bill on the Sales Recapitulation Sheet compile the information and place only totals in respective columns at the end of month. At the end of the month the form will furnish the total sales with cost separated as to material, labor and direct job expense. These respective totals will be used in closing journal entries monthly, as explained later under "Closing the Books for the Month."

Notice that the form provides for contract work or time and material work, also stores sales. One article of store sales, i.e., lamps, is given two columns because of the present and future importance of this article, now that central stations are discontinuing the practice of renewing lamps and are putting that article on a strictly merchandising basis. "Cost of Lamp Sales" and "Cost of Store Sales" refer, of course, to the original direct cost of the goods, not to the overhead cost of selling. Two extra columns are provided on this sheet that can be used for any other sub-division desired, such as "Fixture Sales," "Repair Sales," etc. Credits issued to be totaled and costed when rendered separately to customers and deducted from respective totals on sales recapitulation at end of month, so that various totals will show net sales and respective net cost.

Form 11—Accounts Receivable

This is a simple form of sales ledger page, with debit, credit and balance columns, but if the particular business of any contractor necessitates a different form of sales ledger sheet, such sheet, of course, can be substituted.

Form 12—Cash Received

Enter all receipts from customers' payments in "Accounts Receivable" column, and discount deducted under "Cash Discount Allowed."

All receipts other than those affecting "Accounts Receivable" are to be entered in the column headed "General

FORM 10

Sales Recapitulation Sheet

*For month of*____________________

CONSTRUCTION SALES							LAMP SALES		STORE SALES		SALES	
Customer's Bill No.	Job No.	Mdse. Cost	Labor Cost	Direct Job Expense	Cost of Sales	Sales Billed	Cost of Lamp Sales	Lamp Sales Billed	Cost of Store Sales	Store Sales Billed	Cost of	Billed

This sheet provides an easy accessible record of all kinds of sales, showing the cost, amount and gross profit. Size 9 x 14

FORM 13

Cash Paid

Voucher Number	Check Number	Date	Name	Folio	Accounts Payable	Discount Earned	Bank	Bank Balance	Bank	Bank Balance

It is well to insert in the "Bank" columns name (or names) of bank. This is one of the most valuable records of the system. See Cardinal Principle 5. Size 9 x 14

FORM 14

Voucher Disbursement Book

CREDIT				DEBIT												
Name	Voucher No.	Folio	Accounts Payable	Mdse.	Labor	Direct Job Expense	Folio in Gen'l Ledger	General Ledger	Salaries	Transportation	Stat. and Office Supplies	Warehouse Expense	Tel. & Tel.	Postage	Automobile	Misc.

This is one of the Most Valuable Records of the System. See Cardinal Principle 5. Size 9 x 14

Ledger" and posted direct to the credit of the respective accounts in the general ledger.

Cash sales in total are to be recorded daily in the column provided.

In the columns marked "Bank" should be entered all deposits made in the banks. These deposits should equal the total receipts for the day. That is, the total of all cash receipts ("Accounts Receivable," "General Ledger" and "Cash Sales") should equal the total deposit in bank or banks. This provides a monthly check on receipts and deposits for the owner of the business.

The total of all columns should be carried forward (in ink) to new sheets, and instructions for closing cash book at the end of the month are furnished in "Closing the Books for the Month."

All payments, of whatever nature, are to be entered in column marked "Accounts Payable" and the discount obtained under "Discount Earned." Columns are provided under "Bank" in which should be entered all payments at net amount, on the same line as the entry to "Accounts Payable," so that at the end of the each month the total payments, less discounts, should equal the totals of withdrawals from the banks. All checks should be entered in the "Accounts Payable" column for the gross amounts of invoices. Discount is entered in "Discount Earned" column, and the net amount of the check in "Bank" column.

The sheet is placed in the same binder as the "Cash Received" and "Cash Paid" sheets provision is made for two bank accounts, and on the latter sheet are columns for balances.

Form 14—Voucher Disbursement Book

All indebtedness of whatever nature, whether merchandise, labor, direct job expense or overhead, should be assembled under the name of the vendor, totaled and posted once each month when bills are paid net or as frequently as bills become due on a discount basis, to the credit of such vendor's account in "Accounts Payable" column These bills are to be provided with consecutive voucher numbers, which are to be recorded in the column indicated.

In order to obtain an analysis of the entries made under "Accounts Payable" column and to provide the proper debit entries, enter on the same line as recorded in "Accounts Payable" column the distribution of the amount credited to the vendor.

This debit classification for the distribution of a credit entry runs from "Merchandise" to "Miscellaneous." It is a very flexible arrangement. Columns headed "Merchandise," "Labor" and "Direct Job Expense" provide, of course, for the chief direct charges. The remaining columns, from "General Ledger" to "Miscellaneous" provide for any other account not columned, and also for the various overhead charges.

Columns from "Merchandise" to "Miscellaneous" are to be totaled at the end of the month and posted to the debit side of the account of the same name in the general ledger. Disbursements to "General Ledger" columns are to be posted to the debit of the respective accounts in the general ledger. The entries to "Accounts Payable column are to be posted to the credit of the respective accounts in the accounts payable ledger.

For all overhead charges columned in this form, separate accounts should be opened in the general ledger for those omitted. It is well to beware of the "Miscellaneous" expense column, for it is too often the catchall of overhead charges, for which a separate account should be opened.

Debit distribution of all vouchers for which specific columns are not provided should be entered in "General Ledger" column and posted directly to same account in general ledger. There are a great many entries, such as rent, insurance, and other expenditures incurred so infrequently that it is not necessary to provide disbursing columns in this book, and these are to be entered in the "General Ledger" column as the items are vouchered to accounts payable.

We strongly urge that a Petty Cash account be kept, to be started on the following basis:

Draw voucher and give to book-keeper sufficient amount to take care of small cash expenditures for express and expense items for fifteen days. As the bookkeeper or cashier wishes to replenish the cash on hand, voucher the receipts held for expenditures in voucher disbursement book to credit of Accounts Payable—"Petty Cash Account"—and debit to respective expense columns in same book.

Check is then drawn to order of Petty Cash, and to cover such voucher and money turned over to the bookkeeper. Receipts from Cash sales or other sources must be deposited in bank and not confused with Petty Cash money.

Form 15—Journal

This Journal is to be used for all transfers from debt to credit of any accounts receivable and accounts payable or general ledger.

Certain closing entries at the end of each month are also to be made through this Journal, as explained later in "Closing the Books for the Month."

Individual items entered during month under either the debit or credit of the respective column should be posted directly to the various accounts in each book with the exception of the "Merchandise" column (both debit and credit) which can be totalled at the end of the month and posted in one entry to "Merchandise" account.

Form 16—Accounts Payable

Credit entries are obtainable from "Accounts Payable" column in the voucher disbursement book, and debit entries from the "Accounts Payable" column in the cash book. This is a loose leaf form.

Form 17—General Ledger

The general ledger provided is a bound book with debit, credit and balance columns.

Full instructions for opening of the accounts and entries are provided in Section I.

Form 18—Trial Balance

When starting new system, trial balance should be obtained, and at the end of each month totals are copied from the general ledger, the accounts corresponding to those listed in the trial-balance book.

Printed spaces are provided in the trial balance book. If a more detailed classification is desired of either asset or liability accounts, or summary of operations, arrangements should be made, of course, to open corresponding accounts in general ledger for such additional classification.

The sizes of the Forms shown are as follows; Form 1, 5 x 7; Form 2, 3¾ x 6½; Form 3, 5 x 7; Form 4, 9 x 11; Form 5, 8 x 10; Form 10, 9 x 14; Form 11, 9 x 8; Form 12, 9 x 14; Form 13, 9 x 14; Form 14, 9 x 14; Form 15, 9 x 14; Form 16, 7 x 8.

SECTION IV

Closing Books for the Month

Closing the books for the month involves the Sales Recapitulation Sheet, the Cash Book, the Voucher Disbursement Book, the Journal, the General Ledger, and the Trial Balance Sheet, as well as the Summary of Operations.

How to handle each of these is told in order.

Sales Recapitulation Sheet:

Total all columns, and journalize as follows:

Credit total of "Const. Sales Billed" to "Sales Bills" account in general ledger.

Debit total of "Const. Sales Billed" to "Accounts Receivable" in general ledger.

Credit total of "Lamp Sales" to "Sales Billed" account in general ledger.

Debit total of "Lamp Sales" to "Accounts Receivable" in general ledger.

Credit total of "Store Sales" to "Sales Billed" in general ledger.

Debit total of "Store Sales" to "Accounts Receivable" in general ledger.

Debit total of "Cost of Sales" to same account in general ledger.

Credit total of "Merchandise Cost" to the same account in the general ledger.

Credit total of "Labor Cost" to the same account in the general ledger.

Credit total of "Direct Job Expense" to the same account in the general ledger.

Debit total of "Cost of Lamp Sales" to "Sales Billed" in the general ledger.

Credit total of "Cost of Lamp Sales" to "Merchandise" in the general ledger.

Debit total of "Cost of Store Sales" to "Sales Billed" in general ledger.

Credit total of "Cost of Store" to "Merchandise" in general ledger.

Obtain the cost of cash sales from duplicate cash sales slips, and make the following entries in the journal:

Debit the total cost of cash sales to "Cost of Sales" in general ledger.

Credit total cost of cash sales to "Merchandise" in general ledger.

Cash Book: Cash Received—Cash Paid Out

Note: Total columns and reverse amounts of "Cash Discount Allowed" (under "cash received" sheet) and "Dis-

FORM 5

Material Summary Sheet

Job No. *Name* *Address*

5		4		3		2		1		Total	Credit on Returns	Total	Material	@	Cost	Selling
Date	Amt.	Date	Amt.	Date	Amt.	Date	Amt.	Date	Amt.							

A whole lot of requisitions for material and returned material records need not be spread out, checker-board fashion, at the end of the job in order to get at the total of material used if this material summary sheet is filled in progressively. Size 8 x 10

FORM 11

Accounts Receivable

Name

Address

Date	Folio	Debits	√	Date	Folio	Credits	√	Balance

Accounts Receivable book, sometimes called sales ledger. Loose leaf. Size 9 x 8

FORM 12

Cash Received

Date	Name	Folio	Accounts Receivable	Cash Discount Allowed	General Ledger	Cash Sales	Bank	Bank

It is well to insert in the "Bank Columns name (or names) of bank. This is one of the most valuable records of the system. See Cardinal Principle 5. Size 9 x 14.

Dr. Form 15 *Cr.*

Journal

Mdse.	General Ledger	Accounts Payable	Accounts Receivable	Folio	Name	Name	Folio	Accounts Receivable	Accounts Payable	General Ledger	Mdse.

Size 9 x 14

FORM 16

Accounts Payable

Name ____________________

Address ____________________

Date	Folio	Debit	Date	Voucher No.	Credit	Credit Balance

Size 7 x 8

count Earned" (under "cash paid" sheet) to opposite sides of cash book, as these accounts are to be posted respectively to the debit and credit sides of the same accounts in the general ledger.

Cash Book—Cash Received:

Credit total of "Accounts Receivable" to same account in general ledger.

Credit total of "Discount Earned" to same account in general ledger.

Credit total of "Cash Sales" to "Sales Billed" in general ledger.

Entries during the month in "General Ledger" columns should be posted individually to the credit of the proper accounts in the general ledger so that no postings in total are necessary at the end of the month.

The total receipts for the month, that is
"Accounts Receivable"
"Discount Earned"
"General Ledger"
"Cash Sales"
are to be posted to the debit of "Cash" in the general ledger.

Cash Paid:

Total all columns and post as follows:

Debit "Accounts Payable" to same account in general ledger.

Debit "Cash Discount" allowed to the same account in general ledger.

Totals of the two columns above named should next be credited to "Cash" in the general ledger.

The "Cash" balance in the general ledger should equal the difference between the "Bank" columns—as totaled at the end of the month—of the two halves of the cash book.

Voucher Disbursement Book:

Total each column and rule in red ink.

Credit total of "Accounts Payable" to same account in the general ledger.

Debit total of each column from "Merchandise" to "Miscellaneous" (with the exception of "General Ledger") to the respective account in the general ledger.

Debit any entries in "General Ledger" direct to individual accounts in general ledger.

To the debit side of "Merchandise" account in general ledger post the total of "Merchandise" in voucher disbursement book.

The entries in "Merchandise" column of the sales recapitulation sheet already have been posted to the credit side of "Merchandise" account in the general ledger plus the cost of Lamp and Store Sales.

The difference between the debit and credit in this "Merchandise" account will then indicate the value of merchandise on hand plus merchandise shipped to uncompleted work

Use the amount of this "Merchandise account each month in determining insurance and merchandise investment, and reconcile with physical inventory whenever taken.

Debit "Labor" total to the same account in general ledger. This account reflects at all times the amount of labor invested in completed and incompleted work.

Credit entries to this account are obtained from the sales recapitulation sheet.

Journal:

Use the journal for the following entries after determining upon the reserves and depreciations necessary for the year.

Divide the amounts by 12 and make entries monthly.

Note: The journal is also to be used in closing books for the year or any other time for entries between various accounts in the general ledger where transfer is necessary; but it is understood that the journal is merely a method of transfer from one account to another appearing in any of the books of this system.

Credit. "Reserve for Doubtful Notes and Accounts Receivable" and debit "Loss on Notes and Accounts Receivable."

Credit "Reserve for Depreciation on Furniture and Appliances" and debit "Depreciation on Furniture and Appliances."

Credit "Reserve for Depreciation on Automobiles" and debit "Depreciation on Automobiles."

Credit "Reserve for Depreciation on Tools" and debit "Depreciation on Tools."

Credit "Reserve for Depreciation on Merchandise" and debit "Depreciation on Merchandise."

The foregoing credit accounts appear as liabilities and the debit accounts appear as debits in the balance sheet.

The foregoing reserves and depreciations are recommended but can be enlarged or decreased at the option of the owner of the business.

Any entries made in the journal during the month for purpose of transfer are to be posted individually to the proper account in the general ledger.

General Ledger:

Accounts in the general ledger now should be balanced and entered in the proper place in the balance sheet.

Trial Balance Sheet:

The trial balance sheet covers Assets, Liabilities and Accounts under Summary of Operations.

The balances from "General Ledger" accounts should be transferred to the respective accounts as listed in the trial balance sheet and under summary of operation.

The accounts are all designated in the trial balance sheet as debit or credit as an aid to the proper analysis of these accounts.

The trial balance sheet should prove, of course, as to debits and credits, and separate statement then should be prepared covering Assets and Liabilities and Summary of Financial Operations both for the current month and the cumulative period of the year.

SECTION V.

Balance Sheet Accounts

Assets

- Fixed Investments
  - Real Estate
  - Furniture and Office Appliances
  - Automobiles
  - Tools
  - ....
- Investments
- Current Assets
  - Merchandise
  - ....
  - Labor in Progress
  - Notes Receivable
  - Accounts Receivable
  - Trade Acceptances Receivable
  - Petty Cash
  - Cash
  - Money in Escrow
  - Cash Advances
- Deferred Assets
  - Insurance Premium Advances
  - Taxes Paid in Advance
  - Deferred Charges to Income

Liabilities

- Capital Stock
- Current Liabilities
  - Notes Payable
  - Acceptances Payable

Accounts Payable
....
Taxes Accrued
....
Working Reserves
Reserve for Doubtful Notes and Accounts Receivable
Reserve for Depreciation, Furniture and Appliances
Reserve for Depreciation, Automobiles.
Reserve for Depreciation, Tools
Reserve for Depreciation, Merchandise
Surplus Account

Balance Sheet Accounts—Definition of Controlling Accounts

ASSETS

Fixed Investments

Real Estate—Book value of land and buildings acquired for offices and warehouses, also all other land and buildings acquired by purchase or otherwise.

Furniture and Office Appliances—First cost of all new or important replacements of furniture, appliances, fixtures, etc., for offices or warehouses.

Automobiles—First cost of all auto trucks or other vehicles.

Tools—First cost, including transportation, of all tools, used in connection with contracting end of the business, except equipment chargeable to Furniture and Office Appliances.

Investments—Book value of bonds, mortgages, and stocks of other companies acquired for investment or other purposes.

Current Assets

Merchandise—For book value of materials carried in warehouses. This account will be charged with purchase cost of material received in the warehouse, and will be credited on the same basis with material shipped out. Sub-accounts will be carried with each warehouse or retail storeroom.

Labor in Progress—This account will be charged monthly from the corresponding account in the Voucher Disbursement Book and credited from the corresponding account in the Sales Recapitulation Book. The difference between these debits and credits will represent the value at cost of the unbilled labor.

Note: The balance of this account should be checked at least once in three months with the actual time cards in the job envelopes, and any shrinkage due to labor not chargeable to any particular contract should be credited to this account and charged to "Cost of Sales" account.

Notes Receivable—For face amount of notes.

Accounts Receivable—This account represents the unpaid balances in open accounts against customers, as per "Account Receivable" ledger.

Trade Acceptances Receivable—For face amount of Trade Acceptances held.

Cash—This account represents the aggregate of cash on deposit with banks or other financial institutions.

Petty Cash—Represents amount of cash permantly advanced to the cashier for petty cash expenditures. The amount of this item can be included in balance sheet under "Cash."

Cash Advances—This account will be charged with all temporary and permanent advances to employees on account of traveling and other expenses when such advances are to be accounted for at some later date; also includes contingent funds placed in the hands of local managers for current and immediate disbursements and certified checks deposited with bids.

Deferred Assets

Insurance Premium Advances — This account will be charged with all premiums paid for insurance with the exception of automobile liability and will be credited monthly with a proper pro rata share of such premium as charged to "Insurance" account. The balance in this account should at all times indicate the net amount of premium paid for the unexpired period of existing policies.

Taxes Paid in Advance—This account will be charged with all payments for taxes upon real or personal property when such payments are in advance of the period covered by the tax. A pro rata share of such tax will be transferred monthly from this account to "Taxes" account. The balance in the account should at all times indicate the net amount of taxes paid in advance.

Deferred Charges to Income—To this account will be charged disbursements of an expense nature when applying to a period subsequent to the month in which disbursement is made.

Note: This account may be charged with unusual disbursements for stationery, printed forms, etc., when it is desired to spread the expense over a period of several months.

LIABILITIES

Capital Stock—Capital Stock Common, for face value of shares of common capital stock issued as per stock certificate books. If not a corporation this account should be designated as Capital Account and include all money actually invested by the owner.

Notes and Acceptances Payable—For aggregate of unpaid notes and acceptances payable.

Accounts Payable—For aggregate of unpaid audited vouchers covering purchases of material, payrolls and all other disbursements, as per "Accounts Payable" ledger.

Taxes Accrued—This account will be credited monthly with the estimated pro rata of annual taxes payable (when taxes are levied in advance payments must be charged to Taxes-Paid-in-Advance account. When the actual amount of taxes is ascertained, this account is to be adjusted.

Reserve for Doubtful Notes and Accounts Receivable—During the year this account will be credited monthly with the estimated amount of loss in collections, of amounts charged customers for the month as charged to "Allowances for loss on doubtful notes and accounts receivable" account. During the year this account will be charged wiith losses due to the inability of customers to meet their financial obligations.

Prior to closing the books at the end of the fiscal year this account will be adjusted so that a proper reserve is established to take care of anticipated losses on notes and accounts receivable balances. This reserve should at least equal the total of "Doubtful notes and accounts receivable" account.

Reserve for Depreciation, Furniture and Appliances—This account will be credited monthly with one-twelfth proportion of the estimated annual depreciation on the first cost of furniture and appliances in offices and warehouses, and "Depreciation of Furniture and Appliances" account will be charged.

Note: All standard furniture and appliances will be depreciated at the rate of at least 10 per cent. of first cost annually. Where building is leased depreciation on partitions, shelvings, etc., must be sufficient so that their book value is $1.00 at expiration of lease.

Reserve for Depreciation of Automobiles—This account will be credited monthly with one-twelfth proportion of the estimated annual depreciation on first cost of automobiles and "Depreciation of Automobiles" account charged.

Note: Rates of depreciation must be at least 33 1-3 per cent. annually of the first cost.

Reserve for Depreciation, Tools—This account will be credited monthly with one-twelfth proportion of the estimated annual depreciation on tools, and "Allowance for Depreciation on Tools" account will be charged with the same amount.

Note: Rates of depreciation must be at rate of at least 33 1-3 per cent. annually of cost.

Reserve for Depreciation, Merchandise—This account will be credited monthly with one-twelfth proportion of the estimated annual depreciation to take care of obsolete and slow moving stock, and "Allowance for Depreciation on Merchandise" account charged with corresponding amount.

Note: The rates of depreciation must be at least 6 per cent. annually of the value of the physical inventory at beginning of year.

We feel a word of explanation is due on the question of Reserves in General and particularly in the foregoing five Reserves.

Reserves are simply transfers from surplus accounts as precaution against future losses and if not used to offset loss are in reality a part of surplus.

Through creation of these reserves, the contractor faces frankly the problem of ultimate loss in these five asset accounts, and forces his customers to pay for these Reserves through their inclusion in his overhead expense.

Surplus Account—Before closing the books for the fiscal year an account should be opened called "Profit and Loss," and entries made thereto, either debit or credit, as required, as follows:

(a) Difference between book value and the actual physical value of merchandise inventory, as credited or debited to "Merchandise" account.

(b) Difference between amount of anticipated losses on notes and accounts receivable unpaid at the end of the fiscal year, as estimated, and amount of balance unused in "Reserve for doubtful notes and accounts receivable" account.

(c) The amount of balance open in accounts listed under Summary of Operation.

The net difference between all these entries will be the gain or loss in operation for the year, and the "Profit and Loss" account should be either credited or debited, as the case may be, with earnings or deficit for the year, and this balance either debited or credited to "Surplus" account.

Note: No entries to be placed in "surplus" account during the fiscal year.

SECTION VI.

Summary of Operations

Sales Billed	Cr.
Cost of Sales Billed	
Cash Discount Allowed	Dr.
Commissions Allowed	Dr.
Freight, Express, Carting (unabsorbed)	Dr.
Sundry Earnings	
Commissions Received	Cr.
Cash Discount Earned	Cr.
General Expenses	
Salaries	Dr.
Rent	Dr.
Light, Heat, Power	Dr.
Stationery and Office Supplies	Dr.
Traveling and Entertaining	Dr.
Telegraph and Telephone	Dr.
Postage	Dr.
Advertising	Dr.
Taxes	Dr.
Insurance	Dr.
Association Expenses	Dr.
Warehouse Upkeep	Dr.
Interest	Dr.
Automobiles	Dr.
Other General Expenses	Dr.
Contingency Reserves and Depreciations—	
Allowance for Loss on Notes and Accounts Receivable	Dr.
Allowance for Depreciation on Furniture and Appliances	Dr.
Allowance for Depreciation Automobiles	Dr.
Allowance for Depreciation Tools	Dr.
Allowance for Depreciation Merchandise	Dr.

Summary of Operations—Definitions

Sales Billed—This account represents the amount at which sales have been billed (less credit memoranda issued) also the amount of rebates and other deductions allowed to customers and others as an offset to the billed amount. The net amount of sales billed is obtained from sales recapitulation sheet.

Cash Discount Allowed—Allowances to cover discounts for cash settlements received from customers when such discounts are contingent upon settlement within a specified time.

Commissions Allowed—Allowance to agents and others for service in securing orders.

Cost of Sales Billed—This account will represent the purchase cost of sales billed, as credited in "Sales Billed" account in general ledger. The amount of the cost of sales billed is obtained from the sales recapitulation sheet.

Freight, Express, Carting unabsorbed—This account will be charged through voucher disbursement book with the amount of all transportation charges to and from warehouse: not directly absorbed through cost or through productive expense on job envelope. This account is part of cost of sales but is kept separate for purpose of information.

Commissions Received—Amount received from manufacturers and others as compensation for negotiating sales which are billed directly by the manufacturer or other vendor.

Cash Discounts Received—For cash discounts deducted in payment of vendors' invoices.

General Expense Accounts:

Salaries—(1) Officers and Department Heads—Compensation of President, Vice-Presidents, Secretary, Treasurer, Auditor, Sales Manager and Branch Managers.

(2) Clerks and Stenographers—Amount paid for services of all clerks and stenographers, typists and office boys. (Does not include service of warehouse employees.)

(3) Salesmen—Amount paid for services of all regular or special salesmen, specialists and solicitors.

(4) Warehouse (Stockroom) Employees—Amount paid for services of all warehouse employees, including warehouse superintendent, shipping clerks, receiving clerks, watchman, packers, drivers, porters, elevator-men and messengers.

Rentals—Amounts paid as rental of all offices and warehouse space, also taxes and insurance paid on rented or leased property.

Light, Heat, Power—All expense, not part of lease or rental charge, incurred in lighting or heating offices and in furnishing light, heat and power for warehouse.

Stationery and Office Supplies—Cost of stationery and minor supplies and conveniences, also books, reports, forms and miscellaneous office supplies together with freights or express charges thereon.

Traveling and Entertaining—Payments for transportation, hotel and other necessary expenses of travel for all employees, also expenses incurred in entertainment of customers.

Telegraph and Telephone—For all telegraph and telephone charges, including salary of switchboard operators.

Postage—Cost of postage exclusive of parcel post which is chargeable to "Freight, express and cartage (unabsorbed)" account.

Advertising—Expenses for advertising in newspapers, magazines, also cost of exhibitions and samples.

Taxes—For personal property or other taxes, accrued in monthly proportions. (Taxes paid on rented or leased property are chargeable to "Rental" account.

Insurance—Premiums on insurance on merchandise or fixtures in warehouse and on office furniture and appliances accrued in monthly proportions, also all liability insurance outside of automobiles (automobile liability insurance to be charged to "Automobile"). (Insurance paid on rented or leased property is chargeable to "Rentals" account.)

Association Expenses—Subscriptions and dues for membership in any association for business purposes.

Warehouse Stockroom Upkeep—includes all payments for packing materials such as excelsior, twine, laths, burlap, wrapping paper, etc., consumed in operation of packing or boxing, also cost of repairing and renewing all shortlived or inexpensive tools, together with freight and express charges thereon.

Interest—This account includes all charges for interest, whether for notes payable, trade acceptances payable or open account. The charges to this account are obtained from the "general ledger" column in the Voucher Disbursement Book.

Automobiles—Cost of maintaining and operating motor vehicles, such as rent of garage, garaging and charging of automobiles, repair and renewals of equipment, supplies (gasoline, oil) fire and liability insurance on vehicles.

Other General Expenses—Includes all incidental and miscellaneous disbursements (except warehouse expenses (not otherwise provided for in this classification), such as contributions to civic organizations, charitable gifts, donations, street car fares, advertising for help, directors' fees, state or municipal registration fees, minor emergency expenditures, not otherwise classified, fees for mercantile agency reports, etc.

Contingency Reserves and Depreciation:

Allowance for Loss on Notes and Accounts Receivable—This account will be charged and "Reserve for Notes and Accounts Receivable" account credited monthly with an amount estimated, on previous experience, to be the loss for the current year's bad debts.

Allowance for Depreciation on Furniture and Appliances—This account will be charged monthly with one-twelfth of the estimated annual depreciation on furniture and appliances in offices and warehouses as credited to "Reserve for Depreciation of Furniture and Appliances" account.

Allowance for Depreciation, Automobiles—This account will be charged monthly with one-twelfth of the estimated annual depreciation on automobiles, as credited to "Reserve for Depreciation of Automobiles" account.

Allowance for Depreciation, Tools—This account will be charged monthly with one-twelfth of the estimated annual depreciation on tools as credited to "Reserve for Depreciation of Tools" account.

Allowance for Depreciation, Merchandise—This account will be charged monthly wiith one-twelfth of the estimated annual depreciation on merchandise, as credited to "Reserve for Depreciation of Merchandise" account.

The complete system will be furnished by the National Association complete, boxed, f.o.b. shipping point, for twenty-five dollars ($25.00) to members and forty dollars ($40.00) to non-members, and will include book of instruction that will enable you to open a new set of books or to make the necessary transfer of accounts from your present book to the new system.

[This system may be obtained direct from the head office of the National Association at 110 West 40 St., New York, or through the local sections. Until arrangements can be made for printing in Canada it will be necessary to pay duty in addition to the above figures.—Editor.]

A "Night Lettergram"

from Mr Brettell, President of the Vancouver Association of Electrical Dealers and Contractors is just to hand as follows:

"This is to notify you that we have now received definite news that Mr. W. L. Goodwin, of New York City, the man who launched the campaign against the "Ills in the Electrical Industry," and Mr. Samuel Chase, Special Representative of the Westinghouse Electric & Mfg. Co., Pittsburgh, will be with us at the monster Electrical Convention to be held in Vancouver City, on Monday and Tuesday, 26th and 27th of May, 1919.

"As a member of the great Electrical Industry you are invited to take this opportunity to meet other men in your particular section of the industry; by getting acquainted you may pick up ideas that will be useful to you.

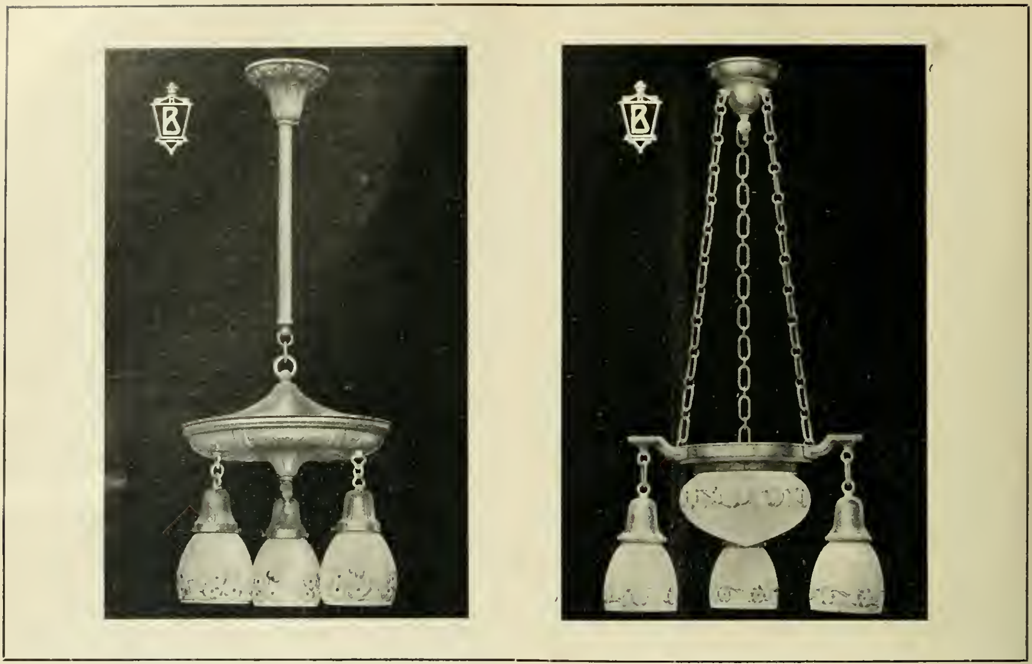
"Acceptances are coming in from manufacturers, central station men, electrical inspectors, wholesalers, and contractor dealers, from Toronto, Edmonton, Saskatoon, Lethbridge, Calgary, Nelson, Vernon, and other places too numerous to mention.

"In order to help the committee in their work, will you please send a card (if you have not already done so) so that your name may be added to the list which now contains more than 75 names.

"Your wife, or sweetheart, is also invited to join us; special arrangements are being made to ensure that the ladies will return to their homes 'good and tired' after having had a 'REAL' time."

406 Yorkshire Building,
Vancouver, B.C.
26th April, 1919

Convention Committee: Messrs. Brettell, Read, Rowland, Jarvis,
S. R. Smith, Crossman, Graham & Walker.



New Banfield Catalogue

W. H. Banfield & Sons, Limited, Toronto, have prepared a French edition of their lighting fixture catalogue, designed especially for Quebec provice. The Banfield fixtures are meeting with splendid success. The company carry a big stock at all times so that they are able to give very prompt delivery. Each fixture is individually boxed which preserves the finish and makes for ease of handling and neat stock-keeping. Two of their recent designs are illustrated herewith.

Shall Central Stations Sell Electrical Appliances?

One of the questions most frequently discussed in electrical management circles is the advisability of central stations entering into the sale of electrical appliances, or whether they should confine themselves solely to the sale of electric current. The point was debated at length, it will be remembered, at the Toronto convention of the Ontario Hydro engineers last winter when the concensus of opinion appeared to be that it was decidedly the proper function of the central station to demonstrate appliances and to endeavor to popularize and create a demand for new appliances. In places where there were no contractor-dealers, or where these were not sufficiently aggressive to properly cover the field, there seemed no alternative but that the central station should step into the breach. There was no voice raised, however, in favor of the use of any but the established methods of merchandising—a fair profit and no price-cutting.

The attitude of the average hydro management towards this merchandising question is pretty well expressed, we believe, by Mr. G. W. Blay, of the Sales Department of the Public Utilities Commission of the city of London in their March issue of "The Live Wire" which, by the way, is the third issue of a very interesting publication destined, if one may judge by its record to date, to play an important part in the development of the merchandising end of the industry in that city. Mr. Blay writes as follows:

The object of the Sales Department of the Public Utilities Commission is to popularize the use of electricity, doing so in a business-like way by the employment of sound merchandising principles. This department is self sustaining, prices are maintained and we do not have cut-price sales. In other words, we conduct a retail business on strict business principles, and we believe the community is served electrically far better than if we were not in this business.

Popularizing Electricity

To fully develop the washing machine and other large appliance fields, the deferred payment plan must be employed. The average prospect cannot pay out $75.00 or $150.00 cash for a household device. If that is required most people will do without. But if the payments are made easy the average householder can afford to use modern electrical conveniences. The ordinary contractor has not the capital to permit deferred payment selling. We can do business that way and by employing such a method can spread the gospel of electricity farther and wider than the contractor can without it.

We advertise liberally and pay a great deal of attention to our show window and sales rooms Each month we feature some appliance. We do this by advertising in the newspapers, by special window display, by mail campaign.

By these methods the use of electricity in the home is popularized and the contractor and dealer receives a distinct benefit. They cash in on our advertising, for it also appeals to those of their customers who are in the habit of buying things electrical from them. It increases the total sale of appliances in the city and each contractor naturally gets a share of the new business.

We are also in a position to give better break-down service than the contractor. Our trouble men are specially trained to locate and correct faults in the appliances we sell.

Our relations with contractors are quite amiable. We turn over wiring and repair jobs to them and we do not take an unfair price advantage.

It is sometimes maintained that by entering the merchandising field, we as a public utility, are taking advantage of our position as author of things electrical in the community. We agree. We are taking an advantage, but it is not an unfair advantage, as we are following a business-like course. If we do not utilize our position in this way we will not be advancing electrical industry as we should. We have a responsibility to the industry that cannot be shared by any other branch of it. We distribute the energy which is the foundation of the business and if we can legitimately increase the use of electrical energy we should do so.

There may come a time when the contractor-dealer can fully and competently handle the sale of electrical devices. Although this may now be the case in individual instances, broadly speaking it is not so. Until that time we have our place in the merchandising field.

A New Tumbler Switch

The Duncan Electrical Co., Ltd., Montreal, have just designed, and are now manufacturing, a new tumbler switch. It will be noticed from the accompanying illustration that the cover is merely snapped on, in place of the old method of the use of screws. Another feature is that the wire holes in the base are sufficiently large to allow the loom to be inserted into same; thus doing away with the cutting of the loom when the latter projects through the plaster. This makes for better insulation. The lever is insulated with hard fibre, reducing breakages to a minimum. The switch is quick make and break. Installations should be made with the lever up, and with the switch blades also in that position. To switch the light on, simply press the lever gently downward.

Hamilton District Electrical Association

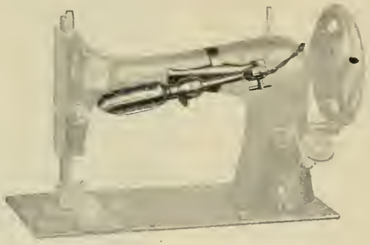
At the April meeting, in the Royal Connaught Hotel, of the Hamilton District, announcement was made by the president, Mr. V. K. Stalford, that the membership of the association was 100 per cent. for the city of Hamilton. This does not include the applications from associates and members from outside districts. This must be very encouraging to the officers. A number of very interesting subjects were discussed at this meeting; one in particular was a new agreement from Local 105, I.B.E.W., for a new schedule of wages to take effect on May 1, 1919. This subject was discussed at great length. It was decided to submit a proposal to the Local to have working rules similar to the Toronto district association, adopted in the Hamilton district. A conference committee was appointed to meet the conference committee of local, to discuss the matter further.

On Monday, April 21st, at the Royal Connaught Hotel, Hamilton, a further meeting of the Hamilton District Electrical Association was held. There was a very large number of members present. The report was received from the Conference committee who had been negotiating with local 105, I.B.E.W. It is proposed to adopt and put into effect working rules in the Hamilton district similar to the rules at present in use in the City of Toronto. The committee reported progress in this matter. Another meeting is to be held in the immediate future with the representatives of local 105 to discuss the matter further.

The question of electrical merchandising was discussed at great length at this meeting. The outcome of the discussion was that a committee of five was appointed to consider this very important subject and bring in a recommendation to the Association at the next meeting.

Better Light for Sewing

The sewing machine is naturally placed in a corner of the room where, ordinarily, there is a minimum of light. It follows that either one must go to the trouble of moving the machine—often a laborious job and apt to scratch the floors—or work under unfavorable conditions of illumination. Considering the nature of this work and the unusual strain on the eyes, it is doubtful if there is any point in the home at which a real good light is more necessary. This fact renders very timely the appearance of a contrivance illustrated in the accompanying photograph. It is called the Se-To-So sewing light and is manufactured by the Durkee-Davis Manufacturing Company, Rockford, Ill. This light is adjustable and may be concentrated in various positions for hand work. Considering the mistakes and delays caused by inadequate light on sewing operations it is easy to believe that the installation of this equipment could soon pay for itself in increased product and excellence, to say nothing of the saving to the operator's eyesight.



"One City 100 Per Cent. Wired Up"

Contractors and central stations in more than 400 cities in the United States have signified their willingness to cooperate with the Society for Electrical Development in the nationwide house wiring campaign, "Electrify Your Home." It is interesting to note that of all the 11,000 contractors and central stations to whom the story of the campaign was sent only one has flatly said "You can't do anything for us." That city is Pasadena, California. The message, which comes from the Municipal Light Department is brief and to the point. It says:

"Sorry we have no need for your campaign literature inasmuch as every house in Pasadena is wired and connected. Population 42,000—electric meters connected 15,600. Can you beat it?"

Until all Canadian towns and cities can say the same as Pasadena there is profitable work for the contractor-dealer without ruinous competition on new buildings.

Toronto Inspection Department Moving

The Electrical Inspection Department of the District of Toronto have sent out the following notice, signed by Mr. A. G. Hall, district inspector, advising change of address.

"Kindly take notice that the Electrical Inspection Department, District of Toronto, will move from their present quarters, Room 201, Temple Bldg., to Room 125, Crown Office Building, 26 Queen East, cor. Queen and Victoria streets, on the 29th inst. Telephone numbers will be Main 3541, 3542, 3543.

"We will endeavor to carry on business without interruption and would respectfully request that all applications for inspections required on April 30th be in our office at 201 Temple Building not later than 3.00 p.m., Tuesday, April 29th, after which date permits will be issued from, and all mail addressed to :

"The Electrical Inspection Dept.,
Room 125, Crown Office Building,
26 Queen Street, East, Toronto."

Letter to the Editor

The following is an extract from a letter just received from one of our readers:

"An investigation into the business conduct of the Marconi Wireless Company would seem to be in order. Two returned soldiers with whom we have spoken in the last few days advised their families by wireless when they were nearing Halifax, but neither of these messages were delivered. If these two cases are typical of the way the messages are handled it looks as though somebody were getting something for nothing. A recent newspaper item states that the Dominion government is granting $61,200 a year in subsidies to the Marconi Company."

The Bay State Street Railway Company, which operates in 90 cities and towns in eastern and south-eastern Massachusetts and extends into New Hampshire and Rhode Island, has been sold at auction for $3,600,000 under a reorganization plan by which the property will eventually be in the hands of the Eastern Massachusetts Railway Company and operated by five public trustees.

Current News and Notes

Cloverdale, B. C.

The local light commissioners at Cloverdale, B. C., have renewed for another year their contract with the B. C. Electric Company for supplying power to the town. It is proposed to extend the system up as far as Surrey Centre and estimates to this end are being prepared.

Edson, Alta.

The Edson Light & Power Co. Limited, Edson, Alta., have been incorporated.

Halifax, N. S.

A hydro-electric commission, along the lines of the system that has obtained in Ontario for the last ten years, is announced as the latest step in the program of the Nova Scotia government. To this end two bills, one respecting the development of electric power, from water resources, and the other respecting water and water courses, have been introduced in the provincial legislature.

London, Ont.

The London Street Railway Company have arrived at an amicable settlement of the demand for increased wages recently made by their employees. The new scale involves a general advance of three cents an hour with a maximum rate of 38 cents. Twelve cents an hour extra will be paid for overtime, Sunday work to come under this heading.

Montreal, Que.

The Golden Electric Company, Montreal, have registered. They are electrical contractors and dealers in supplies.

Letters patent have been granted to the Montreal Armature Works, Limited, Montreal, who will take over the business now carried on by the Eastern Electric Company. The capital stock is $50,000 and the provisional directors S. D. Sweetman, Stanley H. Cunha, P. J. Dolan and G. A. Druett.

Peterboro, Ont.

The Bell Telephone exchange building at Peterboro was destroyed by fire on April 20th.

Regina, Sask.

Tte ratepayers of Regina, Sask., will shortly be asked to vote on the "one-man" car question. Permission to operate this type of car was given a few weeks ago in the provincial legislature, but it was provided that the matter should be voted on locally in each case.

St. Thomas, Ont.

The city council of St. Thomas, Ont., have granted the London and Port Stanley Railway Company permission to place two extra tracks in Kains street for switching purposes, providing adequate protection is given at crossings.

By-laws will be submitted to the ratepayers of St. Thomas on May 27th seeking the expenditure of approximately $45,000 on street railway improvements.

Swift Current, Sask.

The Carter-Jones Electric Company, Limited, Swift Current, Sask., have been incorporated.

Toronto, Ont.

The Toronto Electric Supply Company are opening an office and showrooms at 170 Bay Street, Toronto.

Fire on the night of April 27th caused loss estimated at about $100,000 to one of the buildings of the Canada Wire and Cable Company, Dundas Street, Toronto. The main factory was saved.

Vancouver, B. C.

To assist its employees in finding homes, and thereby relieve a serious situation in Vancouver at the present time, the B. C. Electric Railway Company have set aside a fund of $50,000 which will be loaned at six per cent. for a term of twelve years. In discussing the project, General Manager Kidd said: "My reason for making the proposal was to relieve, as far as possible, our employees from the pressure of high rents, give them homes of their own, and thereby induce thrift and interest in their community. Many of them have been inconvenienced by having the homes they rent sold over their heads. Some of our employees already had lots but had not the wherewithal to build unless at high rates of interest, when the monthly charge for interest and principal would be much heavier than rent."

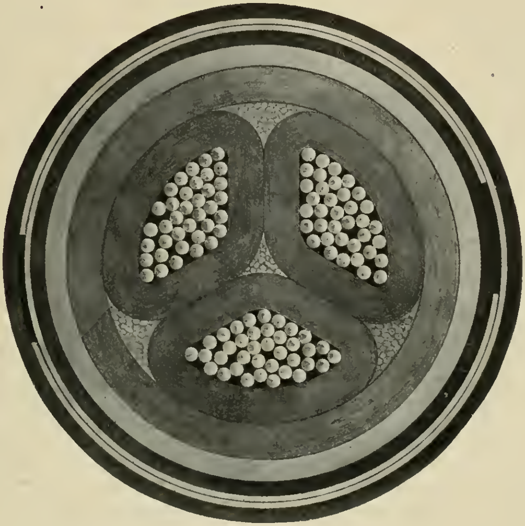
Vernon, B. C.

The city council of Vernon, B. C., have found it necessary to increase the lighting rates. Commencing May 1st the rate will be 14 cents for the first 100 kw.h.; 13 cents for the next 200 kw.h.; 12 cents for the next 300 kw.h., and 11 cents for all over that, subject to a discount of 20 per cent. if paid before the 15th of each month. The old rate was 12 cents up to 500 kw.h., with a similar discount.

York Township, Ont.

A by-law submitted to the ratepayers of York township, authorizing an expenditure of $200,000 for the purchase of existing lighting systems and their extension, was passed on April 5th.

POWER CABLE



350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

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Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary Vancouver

Condensed Department

Publisher's Notice

Advertisements under "Situation Wanted" or 'Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

ELECTRICAL ENGINEER, graduate, wants position; has had considerable experience as an electrician; would consider position as an electrician. Box 928, Electrical News, Toronto. 9

ELECTRICIAN, experienced in the operation of hydro-electric power plants and at present superintendent of plant, would like similar position. Apply Box 888, Electrical News, Toronto, Ont. 6-9

For Sale

1—150 H.P. Corliss Steam Engine, made by Cowan & Co., Galt, Ont. Girder frame, left hand drive, side crank, 13' x 26" fly wheel.

Will sell at a bargain.

Full particulars on application to

Hydro Electric Commission,

5 t.f. of St. Thomas, Ont.

Assistant to Manager

1900 Washer Company

This opening offers a splendid future to an ambitious man capable of shouldering responsibility. Must have both commercial and mechanical ability and be qualified to assume oversight of all branches of merchandising, accounting, and manufacturing. Applicants must have good previous record for ability and integrity. No application except by personal letter considered. Address H. H. Morris, 357 Yonge St., Toronto. 9

Generator Wanted

WANTED—A 200 K.W. generator set, consisting of Diesel Engine with 60 cycle 2200 volt 3 phase generator. Also one 400 K.W. set ditto. Full particulars with price to Box 300, 119 Board of Trade, Montreal. 9

WANTED

Graduate Mechanical Engineer

Considerable shop experience, also thorough knowledge of turbines essential.

Hydro Electric Power Commission
190 University Avenue,
Toronto

Practical Precaution for Fighting Turbogenerator Fires

Various methods of fighting the fires that sometimes do occur in turbogenerators are in vogue. The use of water and steam have found favor for putting out fires, while the use of carbon dioxide and carbon tetrachloride have been suggested. In all cases one of the first things to be done when a generator catches fire is, of course, to shut off the air intake, and in this way prevent the fire being fanned into an intense heat that would melt laminations, burn off end-turns and in other ways cause havoc.

In turning steam or water into a large turbo-generator, it has been found difficult to gain entrance to the generator once the fire has started. The heat produced has been found to be so great that it is very difficult and a belated job to open the generator casing through which water or steam may be played into the interior of the generator. Time is also required to obtain steam lines or fire hose unless they exist in the turbine room, which they usually do not.

After several disastrous fires in turbogenerators of 25,000 kw. and over, the Commonwealth Edison Co. has adopted a method of "preparedness" that is being employed until decision can be made as to whether water, steam or other medium is the more preferable for quenching a fire.

For two 25,000 and 30,000 kw. turbogenerators already installed the company has installed fire service connections in the generator casing, so arranged that water from the fire service system can be turned into the generator from the basement. For the latest turbogenerator of 35,000 kw. now being installed two fire hose connections are installed in the generator casing on the station floor. One of these connections is on each side and so arranged that water under pressure would play upon the end turns. A fire hose is laid beside the machine ready for emergency.

Placing hose connections in the generator casing permits service connections being made quickly—and speed counts, it prevents accidents occurring such as those due to turning on water under high pressure with a hose nozzle turned off, flooding of floors and adjacent apparatus, and thus tends to reduce the extent and seriousness of internal turbogenerator fires. Having a hose connection available, ready for connection with a water or steam line is preferable to having the water or steam line actually connected up, because of the possibility in the latter case of water leaks, or steam condensate entering the generator, or accidental opening of the valves.—Electrical Review.

How a Washer Washes

A great many merchants have formed an incorrect idea of how an electric washer really washes. This is particularly true of the dolly-type washer, the prevailing opinion being that in this type the clothes are cleansed by rubbing against the corrugated sides of the machine. This is not the case, however, for in this as in all other types the clothes are washed by circulating the water through them, the corrugations being principally camouflage, although they do agitate the water to some extent. This was explained in a recent address by Thomas Casey, Chicago.—Electrical Review.

PETRIE'S LIST
of NEW and USED
MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
2	75	3	25	550	725	Westg.
2	52	3	25	550	720	Lancashire
	50	3	25	550	720	Westg.
2	40	3	25	550	710	Westg.
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	25	3	25	550	1440	J. & M.
1	25	3	25	550	725	Westg.
1	25	3	25	550	720	Lancashire
1	20	3	25	550	1440	J. & M.
1	20	3	25	550	750	C. G. E.
1	20	3	25	550	710	Westg.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg
1	15	3	25	550	710	Chap. & W.
2	10.	3	25	550	1400	Lancashire
1	10	3	25	550	720	J. & M.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
4	4	3	25	550	1400	Excelsior
2	3	3	25	550	1500	C. G. E.
4	3	3	25	550	1400	Excelsior
1	2	3	25	550	1440	Excelsior

Write Us for Prices

H. W. PETRIE, Limited
Front St. West - Toronto, Ont.

Electrical News
Generation, Transmission and Application of Electricity

Published Semi-Monthly By

HUGH C. MACLEAN, LIMITED

HUGH C. MacLEAN, Winnipeg, President.
THOMAS S. YOUNG, General Manager.
W. R. CARR, Ph.D., Editor.

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Telephone A. 2700

MONTREAL - Telephone Main 2299 - 119 Board of Trade
WINNIPEG - Tel. Garry 856 - Electric Railway Chambers
VANCOUVER - Tel. Seymour 2013 - Winch Building
NEW YORK - Tel. 3108 Beekman - 1123 Tribune Building
CHICAGO - Tel. Harrison 5351 - 1413 Gt. Northern Bldg.
LONDON, ENG. - - - - - - - 16 Regent Street S.W.

ADVERTISEMENTS

Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for $2.00 per annum. United States and foreign, $2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean, Limited.

Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

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Entered as second class matter July 18th, 1914, at the Postoffice at Buffalo, N.Y., under the Act of Congress of March 3, 1879.

Vol. 28 Toronto, May 15, 1919 No. 10

Electric Trucks Used Extensively In Coal Delivery.

In Boston, Chicago, New York and elsewhere, electric trucks are employed extensively in the movement of coal from the yards to consumers. A study of comparative operating costs indicates that coal is moved at a lower cost per ton mile by electric trucks in the cities than by any other form of transportation. This fact is being realized by many large coal companies, and, as a result, there are some far-reaching developments contemplated in the further application of electric trucks to this particular class of business.

Electric trucks, by virtue of their successful operation, have also won for themselves the high esteem of representative manufacturers of, and dealers in, ice. The Consumers Company of Chicago, Ill., employing twenty-six (26) electric vehicles, may be taken as indicative of the introduction of electric transportation into the ice business. Owing to the mildness of last winter, there will be a great scarcity of ice this summer, and consequently prices of this very necessary commodity will probably reach new heights. Those companies using electric trucks will be conducting the distribution phase of their business—probably its most costly feature—at minimum expense possible and besides will be assured of uninterrupted service from their electric transportation units, blest with but extremely few moving parts and very simple control.

B. C. Government Appoints Public Utilities Commissioner.

Major John L. Retallack has been appointed by the government of British Columbia to be Public Utilities Commissioner for the province under the new Public Utilities Act. Major Retallack is a returned soldier having gone overseas as quartermaster of the 48th Battalion. Later he was transport officer in the railway corps. He is a mining engineer and a member of thee Canadian Mining Institute. The new commissioner was born in Quebec on December 2nd, 1863, and was educated in England. He served for five years with the Royal Northwest Mounted Police before coming to British Columbia in 1890. The appointment of Major Retallack came after several days of public clamor when the government's first appointment of R. H. Gale, mayor of Vancouver, meet with such opposition from the returned soldiers' organization that Mr. Gale tendered his resignation. Several weeks ago it was reported that Mr. Gale was slated for the position. Returned soldiers' bodies immediately protested, pointing to the government's promise to give returned men preference for any positions. When the appointment of Mr. Gale was announced on April 17th, gatherings in Vancouver denounced the move in such terms that Mr. Gale went to Victoria to consult the cabinet. On his return on Saturday, April 19th, he announced that he had resigned. Mr. Gale had been active in opposition to the B. C. Electric Railway, the largest public utility in the province and on his resignation made this statement:

"To be perfectly frank, having had charge practically of the city's side of the case in the B. C. Electric dispute, I prefer to be in the position of arguing this side of the case before the commission rather than sit in judgment upon it. It is four years since I started in to attempt to secure cheaper light and power, and it is only naturally that I would like to present my arguments on the city's behalf as their advocate on what I have always believed to be the merits of the case as it exists to the first tribunal before whom it has been possible to have our case presented for consideration."

Immediately on Mr. Gale's resignation, the cabinet of the province recommended the appointment of Major Retallack and the lieutenant-general made the appointment forthwith.

Canadian Association of British Manufacturers.

The Canadian Association of British Manufacturers and their representatives has been established with branches at Toronto and Montreal. Similar associations have existed in Australia and New Zealand for several years. The objects of the association as set forth in the constitution are as follows: "To further the interests of British trade throughout the Dominion of Canada and to affiliate with and work in concert with kindred associations in other centres of the Dominion having similar objects."

The executive council of the Toronto branch of the new association comprises:

J. Wilson, president (dry goods).
G. A. Marshall (steel) vice-president.
H. V. Andrews, (wool).
C. W. Beal, (pottery).
Captain Harris, (shoe polish).
J. Haywood, (groceries, coffee, etc.).
E. V. Pannell, (aluminium & electrical lines.)

The executive council of the Montreal branch will probably be elected in the near future.

> "Every man owes some of his time to upbuilding the profession to which he belongs."

Electrify Harbour Tracks

The Harbor Commissioners of Montreal have decided to proceed with the electrification of the harbor railway tracks, held up by the war, and plans are now being prepared. The entire tracks running the length of the harbor, will be electrified, thus replacing the present steam system. The following advantages are claimed for the scheme. The doing away with all the inconveniences that are bound to occur with steam engines on short runs, including the smoke nuisance, and with the multitudinous shunting operations necessary for the transhipping of the many products that enter the port each year, and also the quicker handling of all goods. It has many advantages over steam for terminal traction; economy in operation and maintenance; flexibility of control; availability for immediate service; fewer units required for equal service; elimination of corrosion of steel and galvanized iron by acid gases; fire danger reduced and standby losses much reduced. This year the electrification will be pushed as far as possible, in fact, it is expected that that part of the system beetween Victoria Pier and Montreal East will be in operation by September 1st. The ultimate terminus of the system will be Bout de L'Ile.

Montreal Electric Luncheon

The last meeting of the Montreal Electrical Luncheon for the season was held on April 30th, when Captain Trivett, of the Y.M.C.A. Red Triangle Hut, Montreal, described the work of the Y.M.C.A. at the front and in Canada. He also told in some detail of the expenditure involved, particularly in relation to the providing of comforts in France and at the Red Triangle huts in Canada; and of the officers who accompanied the vessels with demobilized men on board and the trains from Halifax. Mr. T. H. Chennell, the secretary of the luncheon, submitted a report of the past season. The attendance, he said, had grown from an average of 48 in 1916 to 70 in 1919. About 125 firms were represented by those who attended the 23 luncheons of the season. The finances had been looked after by a special committee. The sum of $76 had been raised for patriotic funds. Votes of thanks were passed to Mr. W. H. Winter, the president, Mr. Chennell, secretary, and to the papers and entertainment committees.

Annual Meeting Electric Club of Toronto

The annual meeting of the Electric Club of Toronto and the final meeting of the 1918-19 session was held on May 9, the president, Mr. K. J. Dunstan, in the chair. The programme consisted in a brief valedictory by the president, the presentation of reports by the honorary secretary and honorary treasurer and the election of officers for the coming year.

Mr. Dunstan expressed his appreciation of the co-operation of the members during his term of office and congratulated them on the very satisfactory standing of the club as shown by the report of the secretary and treasurer and laid particular emphasis on the high standard of the speakers who had favored the club during the year. He also paid a well-deserved tribute to the work of the secretary, Mr. Frank Kennedy,—a sentiment vigorously applauded by the members.

The secretary's report showed that twenty-seven meetings had been held at which the following speakers had addressed the Club:—

"Experiences during summer of 1918 spent in England and France," Kenneth J. Dunstan, President.

"Architecture," Alfred Chapman, Architect.

"The Evolution of the Aeroplane," J. A. D. McCurdy, Curtis Aeroplanes & Motors.

"British Naval History," R. S. Neville, K.C., Official Referee Supreme Court.

"On Keeping Step," Prof. A. T. DeLury, Prof. of Mathematics, University of Toronto.

"Agriculture Yesterday and To-day," Hon. Geo. S. Henry, L.L.B., Minister of Agriculture.

"Canada's Heritage in the St. Lawrence River," A. V. White, M.E., Consulting Engineer to the Commission of Conservation.

"Women After the War," Miss Wiseman, President Canadian Business Women's Club.

"Britain's Burden in the War," Hon. Dr. H. J. Cody, Minister of Education.

"History of Money," Charles T. Currelly, Director Royal Ontario Museum of Archaeology.

"Forest Conditions in Canada," Prof. C. D. Howe, Associate Prof. of Forestry, University of Toronto.

"From the Viewpoint of a Jew in Modern Days," Rabbi Jacobs.

"The Story of the Diamond," James Ryrie, Ryrie Bros., Ltd.

"Educational Adjustments Resulting from the War," Sir Robert Falconer, K.C.M.G., President University of Toronto.

"A Journey Through Spain," Prof. Alfred Baker, University of Toronto.

"Wireless Telephony," Dr. F. B. Jewett, Director of the Research Branch of the Bell Telephone System and Chief Engineer of the Western Electric Co.

"Labor in Relation to Reconstruction Problems," James T. Gunn.

"Recent Developments in Astronomy," Prof. C. A. Chant, University of Toronto.

"Mechanical Transport and its Development with the Canadians during the War," Capt. F. E. H. Johnson, M.C.

"The Heart of Gaspe," Prof. A. P. Coleman, Dept. of Geology, University of Toronto.

"Repatriation," Brigadier-General Gunn, C.M.G., D.S.O.

"An Electric Blooming Mill Drive," E. S. Jefferies, Chief Electrical Engineer, Steel Co. of Canada, Ltd., Hamilton.

"History of Architecture in France," Prof. John Squair, University of Toronto.

"Preparation of Sera and Vaccines and their Uses in the War," Major J. G. Fitzgerald, University of Toronto.

"Rubber and its Uses," J. H. Coffey, Jr., Chief Engineer and Efficiency Manager Gutta Percha & Rubber, Ltd.

"Chippewa Development," H. G. Acres, Chief Hydraulic Engineer, Hydro-Electric Power Comm. of Ontario.

"Life and Conditions in Paris, Alsace-Lorraine and the devastated part of France during the War and in the Rhine Section of Germany after the Armistice," Monsieur Paul Balbaud.

The report showed a paid membership of 181, as against 175 the previous year. The attendance ran as high as 125. The report of the honorary treasurer, Mr. H. D. Burnett, showed total receipts of $402.55 and a balance on hand of $86.03.

The election of officers for the year 1919-20 resulted as follows: President, W. R. Carr; vice-president, Geo. D. Perry; honorary secretary, H. H. Couzens; honorary treasurer, C. H. Hopper; executive, K. J. Dunstan (ex-officio), D. H. McDougall, W. A. Bucke, J. H. Martin, W. P. Dobson, Joseph Rogers, W. R. Greenshields, S. L. B. Lines, Geo. K. Hyde.

Engineers' Club of Peterboro

The Engineers' Club of Peterboro, Ont., recently held its annual election of officers, which resulted as follows: Hon. president, C. E. Canfield; president, G. R. Munro; vice-president, R. H. Parsons; secretary-treasurer, R. L. Dobbin; directors—two years, R. B. Rogers, P. L. Allison, H. O. Fisk; one year—E. R. Shirley, Jas. Mackintosh, G. R. Langley. The club has had a request for co-operation from the local Board of Trade, and the members have expressed themselves as ready to help in any way possible.

The Water Power Commission of the province of Nova Scotia have issued a progress report covering the field investigations carried on throughout the province during the year ended September 30th, 1918, under co-operative agreement between the Nova Scotia Water Power Commission and the Dominion Water Power Branch.

A National Organization of the Engineering Profession

By Mr. F. R. Ewart

On one thing the engineers of Canada are pretty thoroughly agreed—that our present organization, or lack thereof, is extremely unsatisfactory. Regarding the nature and extent of the trouble and the best cure, there seems to be no unanimity of opinion. In fact, the divergence is so great, and many of the views expressed are so indefinite, that it appears high time that some plan should be proposed as a basis from which to proceed. It is not expected, that the scheme hereinafter outlined should be immediately recognized as the perfect panacea for all our ills. It may, however, serve as the raw material from which a satisfactory working model will finally evolve.

Aims of Organization

All the purposes for which engineering is, or might be, organized can be divided under two heads:

(1) **Technical**—Mutual self-improvement in technical knowledge through meetings, papers, discussions and publications on technical subjects—or any method whereby the special knowledge of one member may become the common property of all.

(2) **Professional**—Elevation of the calling in popular esteem to the dignity of a profession. By legal protection and otherwise to maintain as high a standard of ability and conduct as possible, for the benefit of the public as well as of the membership.

Our engineering societies up to the present have been devoted exclusively to technical purposes. Thought has frequently been given to the professional side, but almost invariably it has been found that the very efficiency of our organizations from this technical viewpoint has been the chief stumbling block to professional progress. Our medical and legal associations are just the reverse, being highly effective professionally, but serving little towards technical advancement. Now that engineers are feeling more than ever the necessity of proper attention to professional considerations, the problem of reorganization must be faced.

The Single Society Idea

The tendency in the past has been to develop a separate society in each branch of engineering. It is useless to argue that this should not be so. As long as engineers feel a desire for organization for technical purposes, the process of sub-division is an inevitable consequence of increasing specialization. For many years in Great Britain, the British Institution of Civil Engineers was the only engineering organization. Its membership embraced engineers of every description. The engineering sciences were then in their infancy and the engineer was usually more of an all-round man. When mechanical, electrical and mining engineering made such strides that it became practically imperative for a man to choose a single branch, separate institutions were organized. In spite of strenuous opposition from those who held to the single society idea these younger organizations to-day are extremely strong and apparently established for all time. It is inconceivable that a retrograde movement could take place. The history of engineering in Canada and the United States is very similar. In every main branch of engineering we have a separate society, large and powerful. These organizations have developed technical work most efficiently and the benefits being derived in this respect could not be sacrificed by any active member.

Unfortunately, engineering can gain proper professional weight and recognition only as a unit. No one branch can speak or act for the whole profession and there is no effective co-operative machinery through which all organizations can function together. Nor could each branch be given separate legislative treatment, for the exact boundaries between one practice and another can never be accurately defined. It must be freely conceded, therefore, that the present system is utterly useless for furtherance of professional aims, no matter how effective it may be on the technical side.

A single society embracing engineers of every stripe in a common membership has often been strongly urged. There can be no doubt that such a society could and would be quite efficient from the professional standpoint. But as means of technical progress it must prove of little value. Must we then seek to make up our deficiencies in one respect by relinquishing most of the progress we have made in the other direction? Or should it be necessary for an engineer to belong to two organizations—one technical and the other professional? It must be remembered that conditions must be dealt with as they now stand. It is neither necessary nor desirable to sweep away everything and rebuild from the ground up. It must be evolution—not revolution.

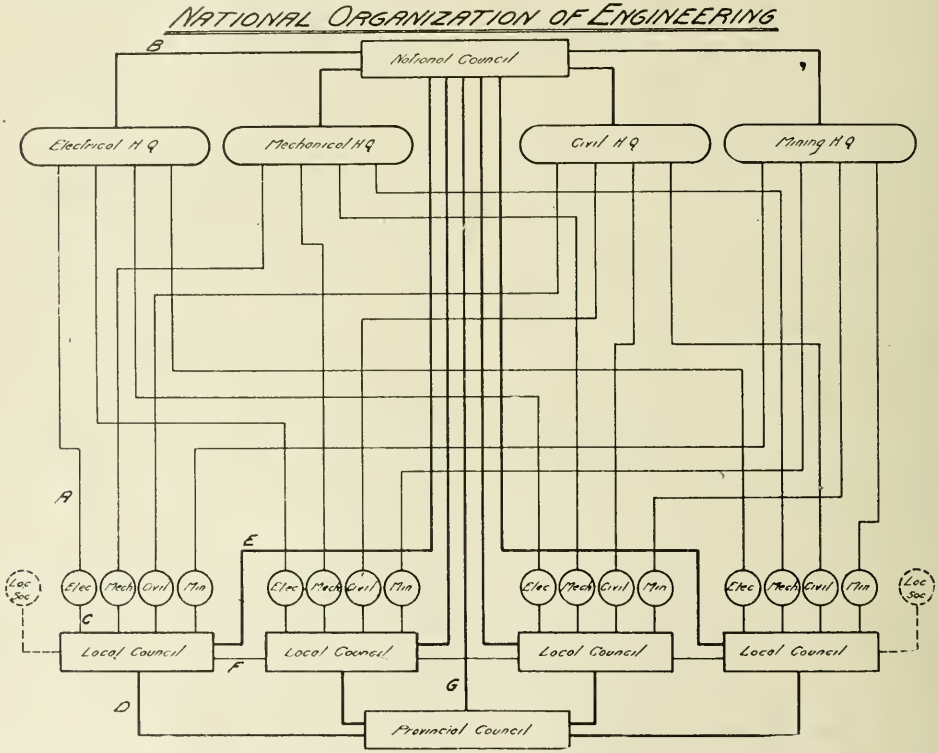
Scheme of Federation

The best solution of the whole problem would appear to be the development of a systematic scheme of co-operation, which will still leave the most complete autonomy for technical purposes to all existing organizations. This might be accomplished by a system of co-ordinating councils. The accompanying diagram gives a graphic conception of the idea. Only a limited number of branches of engineering are shown, but the plan is capable of extension to include any number.

The fundamental unit is the local section, represented by circles. These are all tied together to their respective society headquarters, indicated by ovals. Each oval with its corresponding circles represents a complete society in one branch of engineering, practically as constituted at present. Every individual engineer in a recognized and organized branch of engineering will be a member of a local section. Even when living in a remote district he should belong nominally to the nearest local section, or to one with which he has recently been connected. The only change in this will be to have all isolated members attached nominally to some section or other. It would be desirable to extend the geographical section system more systematically than in the past. Every large centre of population or of engineering activity should have properly organized sections in every branch of engineering for which there are enough engineers to make section activity practicable.

Given a double franchise in the local section and at society headquarters, no engineer would be deprived of his full share of influence. It remains, therefore, to establish a system of co-operative councils, local, provincial and national, to obtain a unified profession which can take action in matters of public import. Regardless of the scope of any question that might arise, there would be a properly constituted body to deal with it, speaking for every engineer within the territory affected.

The organization of local councils should be based on the fundamental principle of equal representation of all sections. If the number of sections is large, one representative from each will be sufficient. If the number is small, two or three representatives may be appointed by each section. But in no case should any one section be able to control the council. Such an arrangement will assure every branch of engineering and every engineer a fair share in directing local activities of common concern. It may be noted from the diagram that any isolated local society may be given representation on the local council. In this way the weight and influence of many good engineers might be given much broader scope than is possible in their present very detached position. Representatives on the council might be appointed by the executives of the sections, but it would be far better if they were elected by vote of the full membership of the sections. A seat in council should be recognized as one of the highest honors in the gift of a section, and the best possible man should be secured to fill it. It would also be essential to each section to appoint a man who will stick on the job, as otherwise the section will fail to exercise its due share of influence.


NATIONAL ORGANIZATION OF ENGINEERING

The chief function of the local council will be to make its weight felt in local (or civic) affairs. Public works are now controlled almost exclusively by laymen, while the engineers appear shamefully indifferent. A local council representing every engineer in the city could render much valuable assistance in such matters, and show the people at large that the engineers are public spirited citizens. A local council may also co-operate with the Board of Trade on any and every matter of civic welfare. By such means the engineering profession might become a great power for good in the community.

Representatives on the provincial council should be appointed by local councils within the province. While the prevailing principle would be equal representation for each local council, a method should be devised whereby all main branches of engineering would also be represented and as nearly equally as possible. This might be accomplished by drawing lots to determine to which branch of the profession the representative from each local council should belong. In any event it should not be difficult to devise some method whereby the provincial council could be made thoroughly representative, both geographically and by branches. It would not be practicable to have the election of members of the provincial council directly within the power of the general membership of the local sections, as such a method would remove the guarantee of balanced representation. No method could be satisfactory which makes it possible for any one geographic section of the province or any single branch of the profession to gain control of the provincial council. The responsibility of local councils in their appointments to provincial council, therefore, again emphasizes the great care which should be taken by local sections in their appointment to local council.

The chief function of the provincial council would be to deal with all engineering matters of general application throughout the province. It should guide the provincial legislature on engineering problems coming within its field, just as the local council would act in civic affairs. A specific function of most serious import, with which a provincial council might fittingly deal, would be the matter of registering, licensing or otherwise controlling admission to the profession under the provision of a provincial act.

The establishment of such acts is distinctly within the jurisdiction of our provincial legislatures. It would therefore be essential for the provincial council to be so representative and of such high personnel that responsibilities of this nature could safely be entrusted to it.

National Council

The national council should be appointed in equal numbers by the headquarters officers of the various societies. It would not be possible to have a direct representative of every local council on the national council, as the number of the former would eventually be too large, and it would not be possible to assemble them regularly enough to transact business efficiently. The same effect for all practical purposes could be obtained by a provision that on all matters of sufficient importance and that time limits permitted every local council should be consulted by correspondence.

The functions of a national council are too obvious to need much comment. The great value of the assistance rendered by the engineering profession to the various national governments during the past war requires no special emphasis here. There can be little doubt that this usefulness would have been increased considerably had there been a complete and thorough national organization for the purpose. The lessons taught by war should not be forgotten in peace. Engineering can be just as useful to the life of the nation in peace as in war, though possibly in less spectacular ways.

Communication

The proper methods of communication should be clearly defined. Since it might be urged that the scheme involves a degree of complication that would result in confusion, it is very necessary that besides clearly defining the exact organization and functions of the various bodies, the methods of communication between them should be equally well understood. The following outline of the purposes of the various lines gives a rough idea of this phase of the question:

A—lines—Purely internal society affairs—all matters strictly pertaining to the individual branch of the profession governed by the society in question.

B—lines—Matters of national concern on which headquarters executives are in a position to completely advise. All executive work on previously approved courses of action.

C—lines—All matters of purely local scope of mutual interest to more than one branch of the profession.

D—lines—All matters within the scope of one individual province. All isolated local sections affected gain representation through lines (C and D). As provincial questions will usually require work or advice of local councils, it will not likely be either necessary or desirable that a direct line equivalent to C and D be established.

E—lines—All matters of national scope on which opinion should be voiced geographically rather than according to branches of the profession. The proper use of the E line in place of A and B lines will be fairly obvious.

F—lines—Will involve only occasional use. Any matter of mutual concern to two local councils may be dealt with through F lines. If matter involves more than two local councils all within the same province, D lines should be used. If two or more in different provinces, E lines must be used.

G—lines—All matters in which the national council can be of assistance to provincial councils in helping to secure a reasonable degree of uniformity and consistency in the actions of the latter bodies. For example, to make the variation between methods of legislative control of the profession in the different provinces as slight as possible. In general, however, E lines would be used in preference to G lines for gathering nation-wide opinion on most matters.

Finance

Generally speaking the expenses of local, provincial and national councils should not be very high. Secretarial work would be the chief item, though some moderate provision for travelling expenses miht be necessary for the latter two. Provision for a proper share of such expenses should be made in the budgets of the local sections with such assistance as may be necessary from the parent societies. As the expense would not be very great and the benefits to be derived should be large, the financing of the scheme should not prove a very serious impediment. If the results to be expected can be realized, it does not seem unreasonable that the individual member might pay a slightly higher fee than now commonly asked, and still get better value for his money. Again, if the complete organization resulted in a general licensing system for engineers, the money raised by license fees might easily prove adequate to defray the expenses not only of provincial councils but even of local councils as well.

Other Benefits

If this plan were carried into effect it should give the engineer the fullest possible expression professionally as well as technically. It should have another decided advantage for any engineer whose interests extend to two or more branches of the profession. He could be placed nominally in the society which covered his chief interest and also be fully recognized in the other branches from which he desired benefit. A complete system of co-operative organization should result in very general exchange courtesies for attendance at technical sessions, in practice as well as theory, as pertains at present. If it became common practice for engineers in one branch to attend such meetings of other branches as appeal to them, all feeling of obligation would disappear. Every engineer would be a member of organized engineering in general, even though nominally attached to one individual branch. In this way a man would have all the advantages of every branch in which he was interested without the necessity of belonging to more than one. If he wished the publications of another society he should have the privilege of subscribing for them at magazine rates, which would return a moderate profit to the society in question. By such means the necessity would be avoided of belonging to several societies to attain full satisfaction of technical needs. In fact, as the professional phase became fully developed, it might be considered proper to restrict every engineer to one society or branch, from the voting standpoint at least.

Possible Objections

As previously suggested, objection may be raised on the grounds of complication. An automatic machine tool is very complicated but it does wonderful work. If every part is designed for its job, and properly keeps its place, only harmony can resultt. A uniform system of nomenclature by which the various bodies are designated, should avoid confusion provided that all other matters are distinctly defined.

Perhaps it may be said that the multiplicity of committees and councils may make it difficult to find the right men to fill them. That is one great weakness of our present societies. Not more than two to five per cent. of the membership are given definite work to do for the betterment of their society in particular and the engineering professional in general. The large remainder contains hosts of capable men, whose ideas and energies should be utilized to the full. The progress of any organization must depend greatly on the amount of useful work that is done by it.

The committee system is about the only known method of employing the rank and file of the membership in productive work.

This is only a rough sketch of the scheme. Much detail would have to be decided, and many points adjusted to put it in working shape. To do so will require a lot of hard work, patience and perseverence. If, however, the article embodies a general idea which can be accepted as feasible and desirable, and is a basis for further action, its purpose will have been fully served. It seems to be the only line on which real progress can be made towards the fullest technical and professional effectiveness. Even if the ideal of a single all embracing society were possible of consummation, there can be little doubt that separate societies would keep springing up in the future. If, on the other hand, we can achieve a form of organization that will insure the fullest measure of freedom, independence, and equality between the various branches of the profession, it matters little what name the whole organization goes by. We can call it one society if we like.

Steam-Electric Plant of the Dominion Power and Transmission Company, Hamilton

I.—The Coal Handling and Boiler House Equipment

The steam plant of the Dominion Power & Transmission Company, located just outside the city limits of Hamilton, on the shores of Burlington Bay, has now been operating for over a year and in point of efficiency is more than meeting the strict specifications laid down for it by its designers. By its dependability it has also demonstrated, in a general way, the soundness of the argument that where conditions of use are such that the customer is prepared to pay for a more perfect service, the hydro-electric plant supplemented by the steam plant frequently offers the only solution. Where the load is purely a lighting proposition it is not, of course, a matter of such supreme importance that short shutdowns should be guarded against; but where it is a matter of dollars and cents or where great inconvenience is caused by power delays, such as, for example, in the operation of electric furnaces, industrial plants operated elctrically and involving a large amount of labor, electric cooking in the home and so on, then it is easily seen that the small added cost of a continuous service may be offset many times by the losses entailed by one or two protracted delays. This is a point frequently lost sight of by customers in making comparison between rates in various cities or rates charged for various operations or by competing companies. There is as much difference, generally speaking, between the different kinds of service rendered by different systems as there is between any other two things we buy. It follows, naturally, therefore, that the cheapest is not always the best.

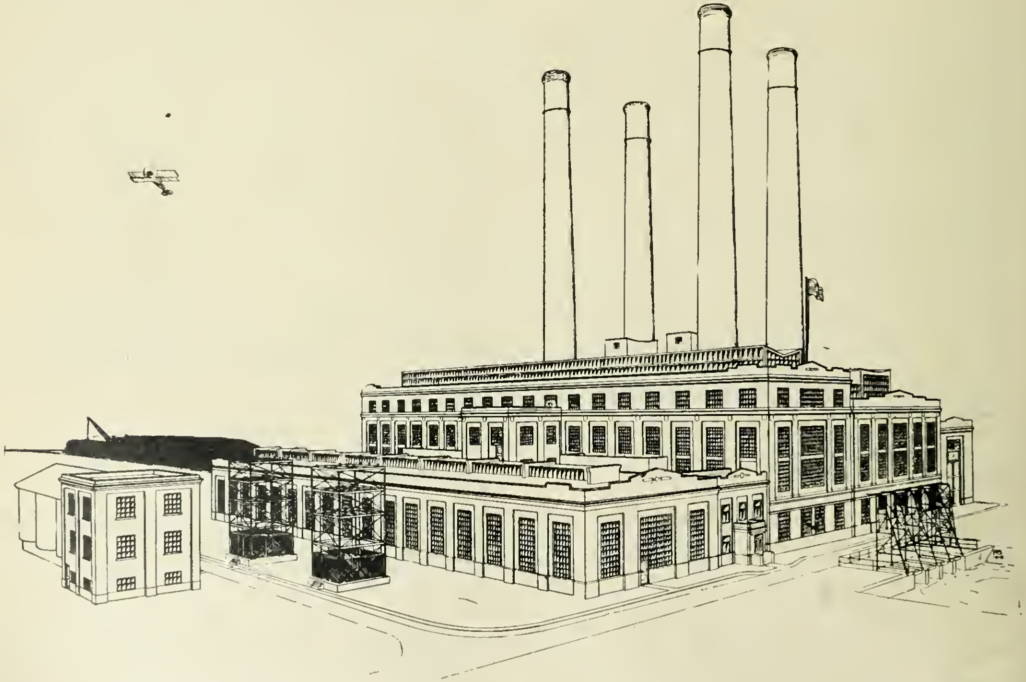


Fig. 1. The steam-electric plant of the Dominion Power and Transmission Co. as it will look when completed

The plant is situated just outside the eastern limits of the city of Hamilton, Canada, on the southern shores of Burlington Bay. It is designed for an ultimate capacity of 75,000

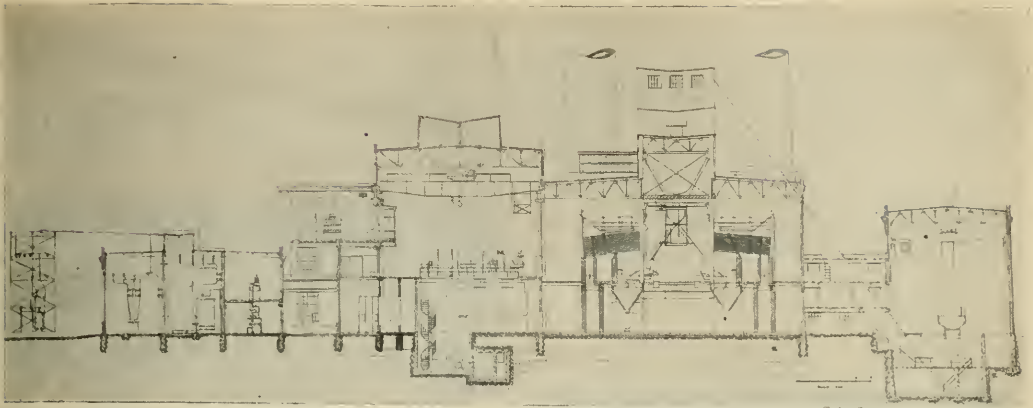


Fig. 2.—General arrangement of plant. From right to left, coal, boilers, steam plant, electrical equipment

kv.a., 25,000 kv.a. of which has been installed at date of writing. The station forms part of the system of the Dominion Power & Transmission Company, and delivers its output at 44,000 volts to the hight tension lines of the company. In addition to its generating capacity the station is designed to act as a stepdown transformer station of 25,000 kv.a. capacity to transform the high tetnsion current to 13,200 volts for distribution to local factories in the manufacturing district located in the near vicinity. 12,500 kv.a. of this stepdown capacity has been installed at the time of writing.

The general arrangement of the plant as shown in diagram, Fig. 2, is very largely responsible for the very efficient figures of operation which this plant has shown. The coal is taken from storage yards (see Fig. 1), or direct from trains and deposited over the crusher hopper into auxiliary storage in the coal building shown at the extreme right of the diagram. The coal is crushed as required, and elevated by means of bucket conveyor to the storage bunkers above the boilers shown in the diagram. A weighing larry distributes the fuel from these bunkers to the stokers.

The coal handling plant has a capacity of 60 tons per hour. The feeder is a steel cased double plunger with opening 26 in. x 30 in. Coal is moved by two plungers, operated by adjustable eccentrics placed one 90 deg. in advance of other. Power is provided by means of sprocket and chain drive from crusher countershaft. Clutch is furnished so feeder may be cut out and crusher driven independently. Discharge of feeder is coupled direct to top of 2 roll crusher. The crusher is a 2-roll type direct geared to 25 h.p. Westinghouse at 750 r.p.m. One roll shaft is supported on rigid, the other on adjustable bearings sliding in guides and backed up by heavy coiled springs. Rolls are set to deliver coal at 2 in. and under. Each roll consists of 2 heavy cast iron spiders supporting 6 cast steel segments. The roll shaft is 4-7/16 in. diameter. The rolls are 26 in. diameter, 24 in. long.

The elevator has a length of 38 feet centres, bucket type. The casing is 5 ft. 0 in. high by 9 ft. 0 in. wide, with ladders on either side of elevator.

The weighing larry has rail centres 21 ft.; hopper capacity 5 ton; hopper scale, 10 ton capacity, with reverse reading beam. Spouts lead from hopper for delivery to stokers with gates operated from cage. The traversing motor, direct geared to trucks, is Westinghouse slip-ring polyphase, type H.F., 5 h.p., speed 935 rp..m., 3 phase, 550 volts, 66 2/3 cycles.

The coal bunker has a capacity of 420 tons. It is equipped with three 18 in. x 18 in. double undercut gates operated by lever from weighing larry. Coal storage building has a capacity of 1,250 tons.

The stokers are the Taylor Stoker Company type. There are four 11 retort stokers, with width 19 ft. 6 in. and depth 8 ft. 3½ in. There are 3 dampers with each stoker and each is also supplied with one side cleaning and two front observation doors. Each pair of stokers has two engines. There are two fan engines and one horizontal for each pair of boilers, two fans for each pair of boilers with two paddle wheels, capable of delivering sufficient air to operate all stokers at 150 per cent rating.

The Boilers

The water tube boilers are by the Edgemoor Iron Company There are four 1,050 h.p. boilers, set singly. The plates are of open hearth steel. The headers are of flange steel plates, attached to drums by flanges, expanded into inner plates of header; manholes are provided with forged steel covers. Flanged oval hand holes, fitted like manholes, are placed opposite each tube; these oval covers being inside are tightened by boiler pressure and independently removable.

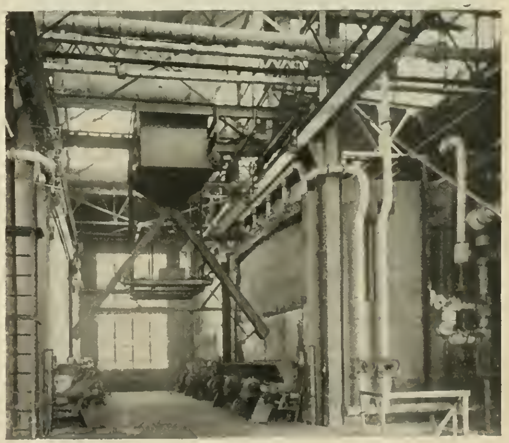


Fig. 3.—Showing one side of Boiler Room and 5-ton coal larry.

The drums have an outside diameter of 35⅛ in., length 20 ft., made of fire box steel, longitudinal seams, double butt strapped triple riveted. Each boiler has four drums of plates, 7/16 in. thick.

Each boiler has 472 Am. standard soft steel tubes, 4 in diameter, 20 ft. long, 2 lower rows No. 9 gauge, balance No. 10. Valves and fittings are as follows:

Three 4½ in. Ashton pop safety valves; four 2 in. Hancock feed water valves; four 2 in. Hancock check valves; two 2½ in. Faber blowoff valves; two 2½ in. Homestead blowoff cocks; one 12 in. Ashcroft steam gauge; one Reliance water column with water gauge and three try cocks.

The fronts are fitted with rolling tube header door. Heating surface is 10,470 sq. ft. per boiler. The weight, approximate, 150,000 lbs. each.

Four Foster superheaters are installed, guaranteed to raise the temperature of 31,500 lbs. of steam per hour, at pressure 200 lbs. per sq. in., to 5,380 F. corresponding to superheat at 150 deg. With boiler operating at 150 per cent. rating, superheat is 160 deg.

The stokers feed the boilers at a sufficient rate to force them to 235 per cent. of rating without difficulty. Fig. 3 shows a view of a portion of the boiler-room. The boilers are equipped with automatic soot blowers and the customary instruments to enable the engineers to operate the boiler intelligently. The flue gases are carried away by two radial brick chimneys.

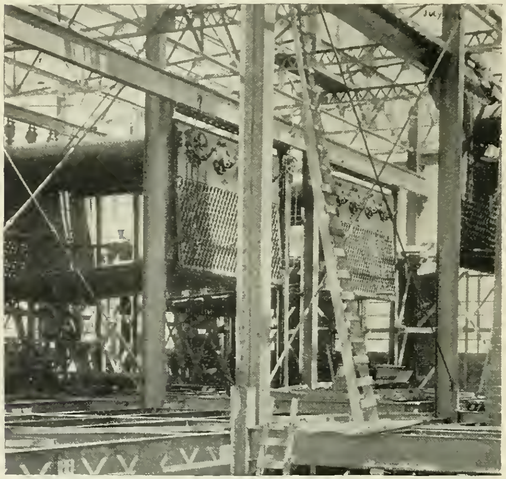


Fig. 4—View of 1050 h.p. Edgemoor boilers during erection.

The chimneys were built by the Canadian Kellogg Company. Dimensions:

Height above foundations, 240 ft.; internal top diameter, 12 ft.; height of base, 22 ft.; cross section of base, round in shape, 22 ft. 2 in. diameter; lining 40 ft. high from point 2 ft. below flue opening; Baffle 20 ft. high and 8 in. thick; lightning conductor 6 copper points, ¾ in. diameter, 8 ft. long, with 1½ in. solid platinum tips. Lower ends of points connected to proper cable encircling chimney from this cable; one 7/16 in. 7 strand No. 10 Stubbs gauge copper cable is carried to ground and connected to copper ground plates; one 4 in. H. & M. patent gauge and connections; one 2 in. pyrometer connection; steps of ⅝ in. galvanized round iron built in on inside of chimneys, spaced 18 in. C. to C.; two cast iron cleaning doors; cement caps put on each chimney and painted two coats heavy pitch.

Water Purification

Make-up water for the plant is obtained from Burlington Bay and is successfully treated by the We-Fu-Go system of water purification. The water softening building is shown at the left of Fig. 1.

The two reaction and settling tanks are: 24 ft. 6 in. in diameter, 19 ft. 4 in. high, dressed Washington fir, 2¾ in. thick, fitted with round steel hoops and malleable iron draw lugs. Tanks are provided with steel ladder outside and wooden ladder inside with platform at top of outside ladder, both tanks are covered. One inch pipe connection is provided for drawing samples, also mercury depth gauge. Gauges and brass faucets are mounted above white enamel iron sink on enamelled plate. Electric contact alarm bell is operated by copper float; a double throw switch admits connections to either tank.

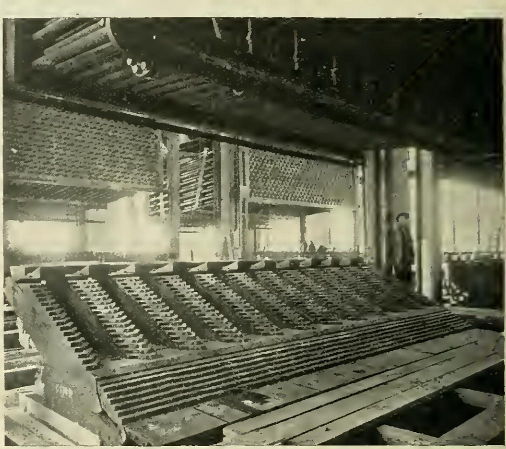


Fig. 5.—View of eleven retort stokers during erection.

The tanks are equipped with mechanical stirring device, each tank taking four hours for treatment of its capacity of water. Water is supplied to tank at rate of 60,000 U. S. gallons per hour.

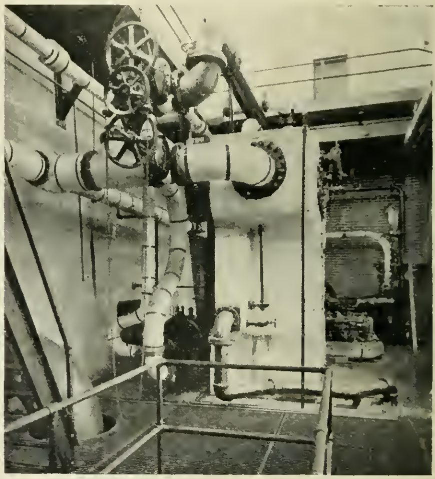


Fig. 6.—Heater, feed pumps, air pump, fan engine, in pump pit.

The Reagent mixing tank is 3 ft. in diameter, 2 ft. high, of 3/16 sheet steel, provided with hand operated stirring device.

The filter tanks are two in number, 8 ft. 0 in. in diameter, 5 ft. 4 in. high, inside dimensions of 2¾ in., Washington fir, round steel with hoops and malleable iron draw lugs. Cross connected, provided with galvanized iron distributing and wash water overflow trough. A filter bed of crushed quartz (98 per cent. silica) is supported by layer of washed and graded gravel. The inlet pipes are provided with brass fitted balanced valves and seamless copper floats, to regulate flow of water from settling tank, and maintain uniform level in filter. An electric alarm bell, operated by copper float rings in water softener and boiler-room.

The air wash pipes in filter bed have discharge openings equally distributed over filter bed and connected to pressure blower. The valves are controlled by numbered cast iron floor stands having extension stems where main operating valves are below floor.

Letters to the Editor

We have a letter from a well-known consulting engineer, criticising the equipment in the Brantford station, described in our last issue. We had time to pass this criticism along to Mr. Catton and also have a reply from him. Both letters follow:

Editor, Electrical News:

In looking through the May 1st number of your paper I note on page 30, the switchboard designed by Mr. Catton, and if the section of the switchboard is drawn to scale, would offer the following criticism:

The disconnecting switch below the bus bars is in a dangerous position for if an operator opened this switch by mistake when the feeder was alive he might cause a flash that would result in a short circuit on the bus bars above.

Referring to the double throw disconnecting switch above the bus bars, it appears to me that the lower switch would be very difficult to open with a hooked pole on account of its location with respect to the bus bars. A man would either have to stand on a stool or chair or else use a pole 15 feet long and at that he would be touching the bus bars with the pole, and evey one knows it is very difficult to hook into an eye of a disconnecting switch with a pole longer than a few feet.

I do not consider the arrangement a good design and believe that such a design should not be submitted to the public as being something exceptionally good and thus permit others to copy same.

The type of double throw switch for throwing a feeder onto the emergency bus bar could make a lot of trouble if these two bus bars were not in synchronism.

Yours truly,
Reader.

Editor Electrical News:

In answer to your communication of the 8th inst. re criticism on switching equipment, I might say that the section drawing of board is not to scale. The spacing between bus and disconnecting switches is 13 inches.

Regarding the double throw switches we might state that they are much more easily operated than "Reader" imagines. We do not find them difficult to operate or we would have placed them higher. However, this equipment does not have to be so placed. Windsor suspends theirs from the ceiling, face of panel to the floor, but in our case the present position was the only place. I know of some very good electrical men who think this apparatus is good and are going to install it.

Regarding the synchronism of bus-bars, it was explained that feeders were paralleled while transferring load to auxiliary bus.

We do not anticipate any of the troubles our critic has suggested because we have used the apparatus since it was installed. We have a vastly improved condition regarding flexibility.

We would like to have our critic see the equipment in the station.

Yours truly,
Brantford Hydro-electric System,
Per W. R. Catton, Superintendent.

Toronto, May 1st, 1919.

Dear Sir:—

You are hereby notified that the Annual General meeting of the Canadian Manufacturers' Association for 1919 will be held in the King Edward Hotel, Toronto, on June 10th, 11th and 12th next. Business will commence at 10.30 a.m. on June 10th.

I earnestly hope that you will make a special effort to attend in order to give the Association the benefit of your co-operation and advice in solving the difficult problems which are now confronting the manufacturers of this country.

The Association is now entering what may be described as the third period of its history. During the first period, from 1872 to 1899, its activities were provincial and its membership limited to about 300. During the second period, from 1899, when it was organized as a National Association to the signing of the armistice, the membership increased from about 300 to nearly 3,500, and branches were organized from coast to coast. The second period saw a great growth of manufacturing. The present period, beginning with the signing of the armistice, will be the period of readjustment from war to peace conditions, the continued and rapid development of Canada as a nation, and I hope and believe, a corresponding development in the activities of the Association and in the increase of its membership.

Three of the most important matters for discussion at the Annual Meeting are (1) the readjustment of the existing relations between employers and employees, (2) the revision of the tariff and (3) the development of export trade. In addition, there will be report of the various committees which, during the past year, have dealt with an unusually large number of subjects of vital importance to Canadian manufacturers. It is from the views and decisions of the members present at the Annual Meeting that the policy of the Association for the coming year is largely shaped.

The programme outlining the business to be transacted will be mailed to you in due course. I appeal to you to make a special effort to be present.

Anticipating the pleasure of meeting you in Toronto on the above dates, I remain,

Yours faithfully,
W. J. Bulman,
President.

The Tungar Rectifier—Its Theory, Characteristics and Application—II.

By Mr. F. Keith D'Alton

In preceding paragraphs (in our issue of May 1st) the underlying principles of the Tungar Rectifier were dealt with, and the marketed production of the manufacturer was described in more or less detail. The performance of the simple single phase rectifier as sold will now be outlined and in addition, the various advantages of different possible combinations of two or more single phase rectifiers will be presented and discussed.

One Half Wave Rectification

A rectifier containing only one bulb and designed to give only one half of the supply wave in the rectified voltage and current, is termed a "One Half Wave" Rectifier.

In Fig. 11 are shown the connections of the bulb and auto-transformer which go to make up the one-half wave rectifier. The auto-transformer, designed to operate on 115 volts, a.c. (frequency considered) has two taps at 26.6 and 28.6 volts respectively, from one end. The small 2 volts part of the winding between these taps has sufficient current capacity to carry the filament current continuously. It may be noted that one lead from the supply runs through and forms the positive terminal of the rectifier secondary (d.c.).

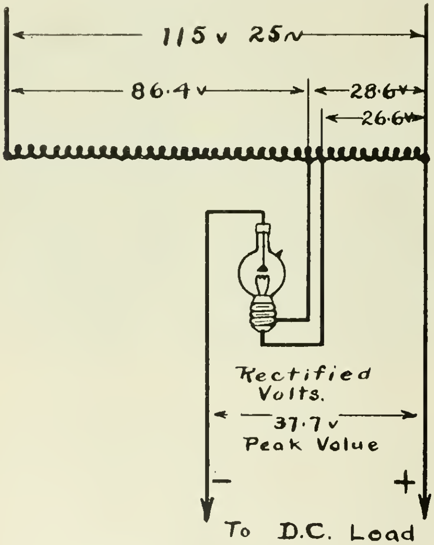
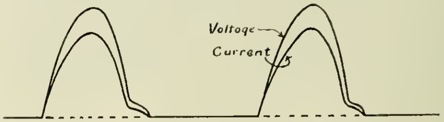


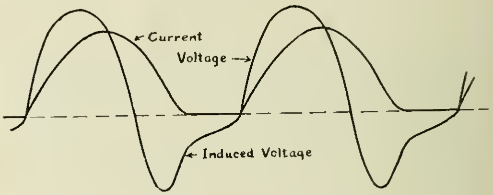
Fig. 11.—Connections of one rectifier for one-half wave rectification.

As to the bulb, it has a filament designed to operate at 2 volts with a current of about 20 amperes. The filament is made of fairly large dimensions in order to have a long life; it being found that the action of the electrons causes a disintegation of the tungsten metal.

When the tube is cold it refuses to allow current to pass through it in either direction, but when the filament is heated current may then pass downward through the bulbs (from graphite to tungsten filament).

The voltage from one end of the auto-transformer winding to the nearest tap will be 26.6 volts, (root-mean-square value) and the peak value of this will be in the neighborhood of 37.7 volts. Comparing Figs. 2 and 3, we find that the peak value of the rectified wave, on no load, is approximately the same as the peak value of the tap voltage. This is not surprising since there is an insignificant drop in the bulb when no current is flowing.





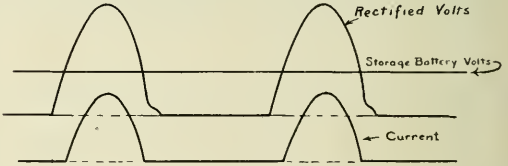


Fig. 12.—(above)—Rectified voltage and current, single-phase—One-half wave, full load, non-inductive.

Fig. 13.—Rectified voltage and current, full load, inductive.

Fig. 14.—(below)—Rectified voltage, storage battery voltage and current while charging storage batteries.

The voltage wave of Fig. 3, with peak value of 37.7 volts will cause a moving vane a.c. voltmeter to indicate 16.8 volts, while a permanent magnet type of d.c. voltmeter indicates 10.0 volts. The form factor undoubtedly is 1.68 in this case; and since this is greater than the form factor of a half sine wave, it indicates that the rectified wave is more peaked or

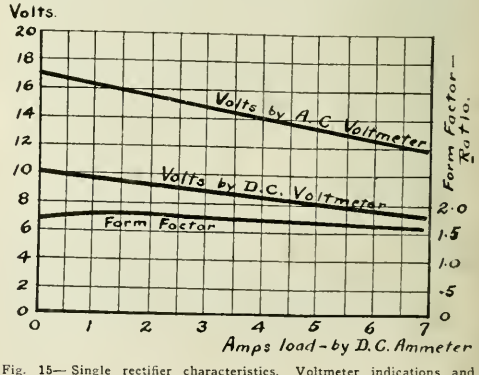


Fig. 15— Single rectifier characteristics. Voltmeter indications and Form-factor

narrower at the base. By observation, we find this to be the case.

The load on the rectifier is connected in as shown in Fig. 11, having due regard for polarity, if the load is such that it becomes necessary to consider polarity.

Different load conditions give different effects. For example, Fig. 12 shows voltage and current waves when the load is non-inductive; the current and voltage (by d.c. instruments) were respectively 6 amperes and 7.7 volts. It will be seen that these waves are of the same shape and "in phase" with each other.

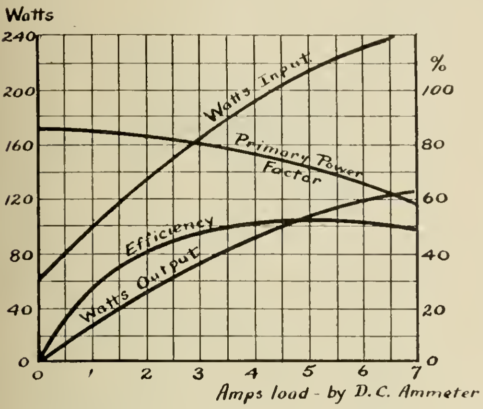


Fig. 16—Characteristic curves—One Rectifier giving one-half wave rectification

If now the non-inductive load be replaced by a load which is highly inductive, the voltage and current waves take the forms shown in Fig. 13. The current starts with the rise of voltage in the direction which can start current through the tube, but, like all currents, through inductive resistances it returns to zero lagging behind the voltage, but not reversing. That part of the voltage wave marked "Inductive Voltage" is not due to the rectifier, but is caused entirely in the inductance of the load as the current dies down. Even after the current reaches zero, there is some residual flux in the iron of the inductive load and this flux, in dying down, causes a gradually reducing voltage.

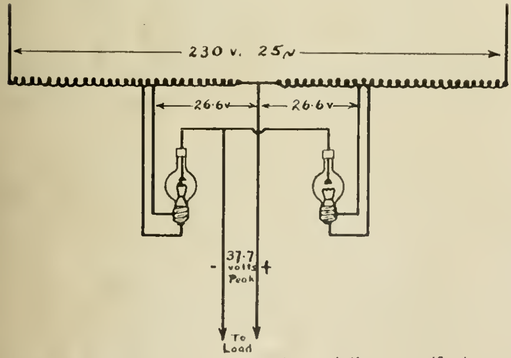


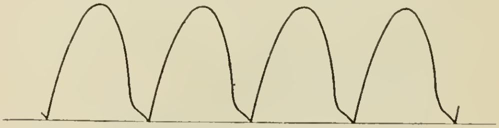
Fig. 17—Connections of two rectifiers for two-half wave rectification.

When a storage battery load is connected to the rectifier we find that current only flows at the times when the rectified voltage is higher than the battery voltage, Fig. 14. In this oscillogram, the waves are not on the same base line. The matter of battery charging will be dealt with more fully in later paragraphs.

Considering the characteristics of the one half wave rectifier as a unit, we find that the drop in voltage under load is proportional to the load current, Fig. 15. Apparently the impedance of the auto transformer and resistance in the bulb are the cause of this, and act in the same manner and proportions as if this size of rectifier had an ohmic resistance of 0.7 ohms.

Fig. 15 also shows the relative values of the indications of the a.c. and d.c. voltmeters and also a slight variation in form factor. As the form factor gradually reduces (as the load increases above 1.5 amps) from 1.77 to 1.55 we judge that there is a step toward the ideal d.c. condition but the approach is not very close.

In Fig. 16 are shown the operating characteristics of the one-half-wave rectifier. The curve showing "power factor" applies only on the supply side of the rectifier and at a time when a non-inductive load is connected to the load terminals. The impressed voltage is alternating, and the primary current, though also alternating, has a wave form which is not symmetrical with regard to its zero line. Here "power factor" is taken as the result of dividing "Input watts" by the product of impresser voltage and primary current as read by a.c. instruments. This method, though standard and correct if the voltage and current waves be both of sine form, is in this case questionable as to its meaning and accuracy It is, however, a method well understood and as used here to show that the primary current increases more rapidly than the load current.



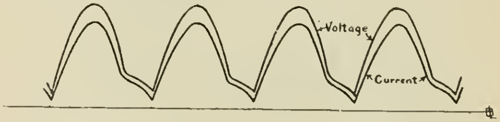


Fig. 18 (above)—Rectified voltage—Single Phase—Two-half wave—No load

Fig 19 (below)—Rectified volts and current, two-half wave—Single phase, full load—non-inductive.

As seen from Fig. 11, there is no method available for regulating the voltage but it may be noted that the rectifier will, in a sense, automatically regulate the current reducing it as the voltage increases, and can be used in a practical way to charge any battery having a voltage less than 20 volts. From 20 volts up to the maximum, 37.7 volts, the charging is too slow a process to be used.

The rectifier is automatic when an interruption of power occurs. The filament simply cools down and the battery cannot discharge. When the power is again turned on, the filament heats up again and the rectifier picks up its load.

Two-Half Wave Rectification

Although the simple rectifier, as placed on the market, is intended for one-half wave rectification only, it is very satisfactory to connect two rectifiers, according to Fig. 17, and supply them with power at 230 volts, single phase.

We then get a rectified voltage (at no load) with twice as many peaks as given by one rectifier, Fig. 18 illustrates the point; the peaks are the same shape and in consequence the a.c. voltmeter indicates 1.414 times the indication of the half wave voltage while the d.c. voltmeter indicates just twice the value it indicated on a half wave.

While the peak values are the same, we see that the form factor for this two half wave voltage is 1,15, a marked reduction from that obtained by a one half wave rectifier.

When a resistance load is now attached, Fig. 19, the voltage drops slightly, the current wave has the same shape as the voltage wave and the form factor suffers no appreciable change no matter what the value of the load. Fig. 20 shows the form factor as a straight line and also shows the indications of a.c. and d.c. voltmeters. A comparison of Figs. 15 and 20 shows that the readings of a.c. and d.c. instruments are closer together at all loads with two rectifiers than with one. Hence the two half waves rectifier is a closer approach to d.c. conditions.

Fig. 16 may be considered to apply to this connection also, except that the load current would be multiplied by two. The power factor and efficiency are not in any way improved.

Three Phase Balanced Star Connection

A study of Fig. 11 will reveal the fact that three rectifiers may be connected in star on a balanced three phase circuit as shown in Fig. 21, in which case the supply voltage must be $\sqrt{3}$ x 115 volts, or 200 volts, 3 phase.

Since we have exciting currents and unsymmetrical waves to handle, the branch voltage will depart from the pure sine form and appear as shown on the oscillogram, Fig. 22. In the different phases these voltage waves will be similar but displaced by 120 degrees from each other. The rectified no-load voltage will have three peaks per a.c. cycle and appears as shown, Fig. 23.

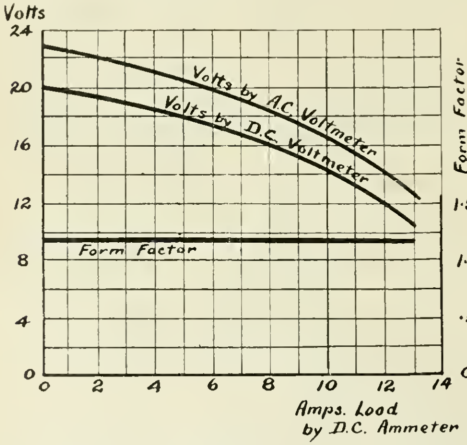


Fig. 20—Voltmeter indications and Form Factor. Two half-wave Rectification.

There can be no interchange of current on account of the valve action of each bulb. Hence the bulbs will work satisfactorily together even though they be on different phases.

This connection gives a decided improvement in form factor over either of the connections previously discussed, as it reduces that ratio to 1.08 (at one quarter of normal load). It will be observed that the waves just touch the zero line.

As non-inductive load is applied, the peaks drop a little and the base of the wave rises from the zero line, Fig. 24. We are now approaching still closer to the direct current ideal conditions. As the load increases the form factor drops, rather quickly at first, and later more gradually, Fig. 25, until a value of 1.04 is reached.

Running under the above conditions it may happen that one or even two of the bulbs may burn out. A bulb may become inoperative. If so, it is usually on account of the wearing out of the filament.

When one bulb burns out the voltage and current waves assume the shape shown in Fig. 26. When two bulbs burn out at the same time, the voltage and current are both very materially reduced on account of the impedance of the two phases without load, and the respective waves are as shown in Fig. 27.

Fig. 28, the voltage and current from this three phase connection with an inductive load, shows us a still better form factor as the ripple is reduced in amplitude, being farther from the base line.

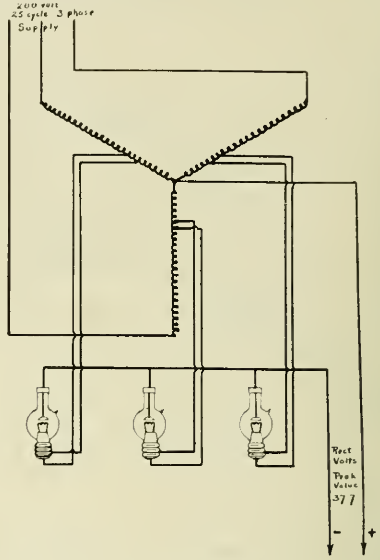
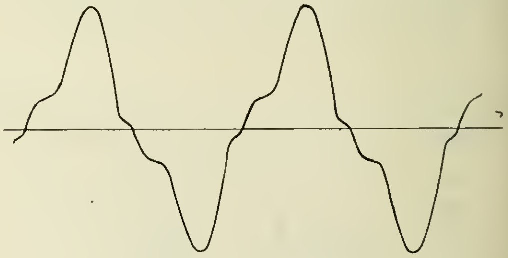
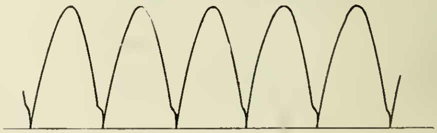


Fig. 21—Three-phase star connection giving three peaks (d.c.) per cycle of a.c. supply.

Considering the characteristics of this three phase combination, Fig. 29, we see that the efficiency and power factor are





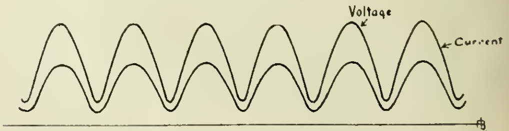


Fig. 22 (above)—Branch 3-ph. unrectified voltage at no load.
Fig. 23—Rectified voltage, 3-ph. star connection—No load.
Fig. 24 (below)—Rectified voltage and current. 3-ph. star connection—Full load, non-inductive.

not in any way improvements on the single phase half way rectifier. The good factor, then, is the chief advantage.

Six Phase Balanced Diametrical Connection

Going one step farther and using six rectifiers on a six phase circuit, Fig. 30, we get a still further reduction in form factor, bringing it down to the value 1.01. Our voltage wave at no load contains only the crests of the six peaks per a.c. cycle, Fig. 31. These ripples are made of still less importance under load, bringing the form factor at full load to a value of 1.005 as in Fig 32. This is a decidedly close approach to a smooth direct current.

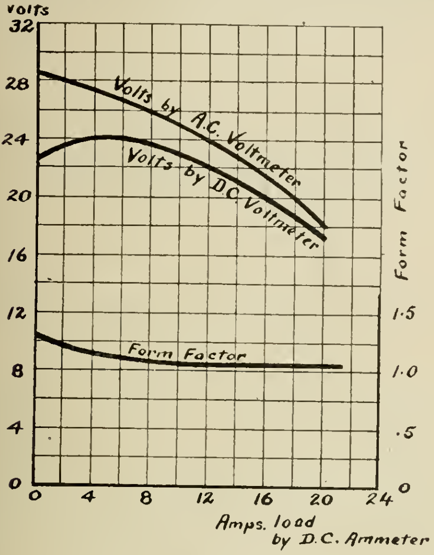
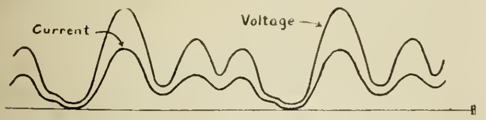


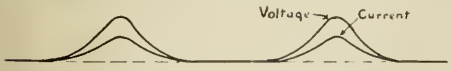
Fig. 25—Voltmeter indications and form-factor

The efficiency and power-factor are not any improvement on the simple half-wave rectifier.

APPLICATIONS OF THE RECTIFIER

Having now fully discussed the theory, and possible connections and combinations of Tungar rectifiers, it seems advisable to consider some of the uses to which this device may be applied.





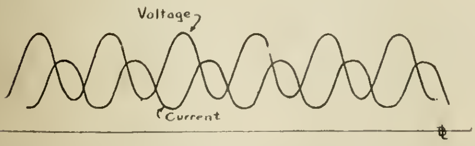


Fig. 26 (above)—Rectified voltage and current—3-ph. star—Failure of one bulb.

Fig. 27—Rectified voltage and current—3-ph. star—Failure of two bulbs.

Fig. 28 (below)—Rectified voltage and current—3-ph. star—Full load, inductive.

Storage Battery Charging

First in importance among the various uses of the Tungar rectifier is the charging of storage batteries from an alternating current supply. The requirements of such a battery in charging are two-fold, that the supply voltage be higher than the battery voltage, and that there be no reversal of current. Pulsations of current are not objectionable for this class of work and it is therefore not necessary to have a good form-factor.

When a single phase, half wave rectifier is charging a storage battery, we get voltage and current as already shown in Fig. 14. It is only that part of the rectified voltage wave which is above the storage battery voltage that is in any way effective in causing current to flow. As the circuit is non-inductive, the current wave must agree with the effective part of the voltage wave. As the storage battery volts increase the current flow diminishes. In this way the rectifier is self-regulating.

For a given battery voltage, up to the maximum of 37.7 volts, there is a corresponding effective charging value to the rectifier voltage. The curve, marked "one half wave" in Fig. 33 gives this effective charging value for the complete range of battery voltage.

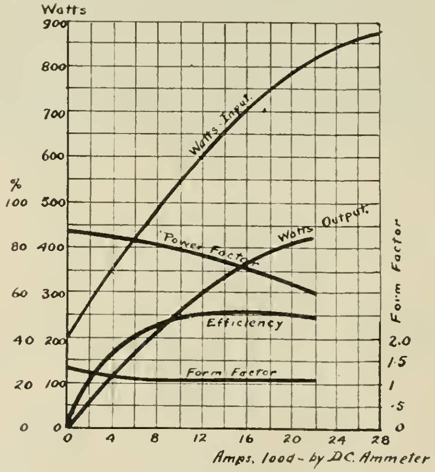


Fig. 29—Characteristic curves with three rectifiers—3-ph. connection.

Care must be exercised to obtain correct polarity in connecting in a battery.

It may be of interest to some readers to make a small calculation on the time required to charge a certain set of storage batteries. It is taken for granted that the reader realizes that the voltage of the battery rises while charging and, for simplicity in calculation, we will let the average value of battery voltage be represented by V.

Let R be the resistance in ohms of the battery as connected and let T be the time in hours for charging.

The resistance of the rectifier may be taken as 0.7 ohms. It is obvious that, as already mentioned, the rate of charging a battery of 20 volts is much slower than with one of 5 volts, not only because the resistance of the 20 volt battery is liable to be higher but the value of the rectified volts in excess of battery volts will be less.

In Fig. 33 are given two curves, one for a single rectifier, Fig. 11, and one for three rectifiers in balanced star connection, Fig. 21 The values of K and K' referring respectively to the one phase and three phase systems, are the effective charging values of the rectified voltage waves.

The effective charging current, I, with one rectifier will be expressed as follows—

$$I = \frac{K}{R + 0.7}$$

Let A H = ampere hours required by one cell.

$$\text{Then the time, } T = \frac{A\ H}{K} \times (R + 0.7)$$

The number of ampere hours necessary to charge a cell, (or, the ampere hours a cell is capable of delivering) is usually specified on the cell. It should here be understood by the reader that the time will be divided by two if two rectifiers be used as in Fig. 17 connection and that K is replaced by K′

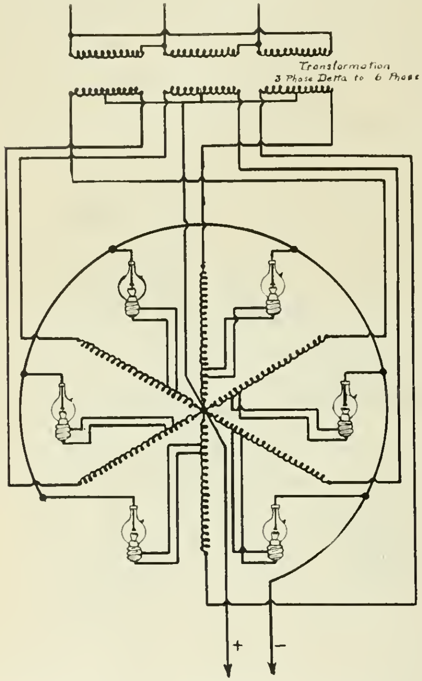


Fig. 30—6-ph. diametrical connection of six half wave rectifiers, giving six peaks (d.c.) per a.c. cycle

if three rectifiers be used as in Fig. 21 connection, giving waves as shown in Fig 34.

sulting from one or several failures of the power supply.

A question has frequently been asked regarding the time lag of the charging current after the rectified voltage has begun to rise above the battery voltage. Experiment has shown that this lag is in the neighborhood of 1/5000 of one second and hence insignificant.

As before mentioned the rectifier is automatic and the battery may be left to charge during the night, no harm re-

Other Practical Applications

The Tungar bulb has other uses than working as a rectifier.

In the modern radio-telephone aeroplane set a bulb built on the same prinicple as the Tungar bulb, is used to control the voltage of the wind-driven generator on the aeroplane. The requirements of this generator are that it produce a constant voltage through a large range in speed, i.e., 4,000—14,000 r.p.m. The bulb employed acts on the differential field winding of this generator, and is found to be quite capable of producing the required steadiness in voltage.

In the University of Toronto, Department of Physics, the bulb has been used to give an alternating current of high frequency when supplied with power by direct current. The energy in this alternating current is very small.

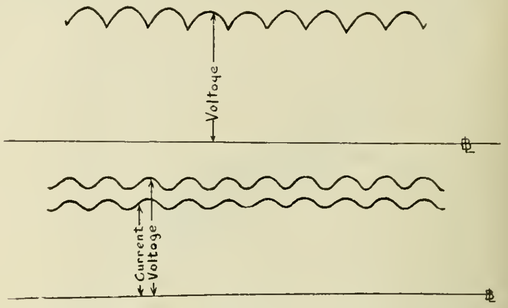


Fig. 31 (above)—Rectified voltage—6-phase Diametrical—No load.
Fig. 32 (below)—Rectified voltage and current—6-phase—Non-inductive load.

The unidirectional current produced as a rectifier may be used for magnetizing magnets, controlling d.c. relays, contactors, and many other devices where the pulsations will not cause trouble.

With the introduction of a "grid," that is a perforated metal electrode between the filament and graphite anode, the bulb becomes an amplifier of oscillations. In this state it is an essential part of the modern telephone repeater, and of both transmitting and receiving apparatus in the radio telephone.

Measurement of Resistance

It may be not a little surprising to the reader to learn that this pulsating current may be used to accurately measure the ohmic resistance of any circuit, even though the circuit be highly inductive. It is, nevertheless, a fact, provided direct current instruments be used.

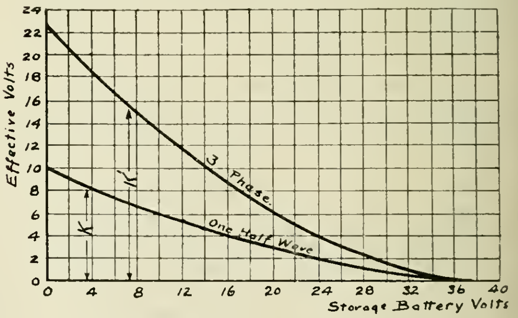


Fig. 33—Effective charging values of rectified voltage waves of one-half wave and 3-ph. connection. K = one-half wave. K′ = 3-ph. connection.

Firstly, with non-inductive circuit, the current waves and voltage waves are identical in shape, hence,—

$$\frac{\text{Voltage drop}}{\text{Current in amps.}} = \text{resistance in ohms.}$$

For this either one, two, three or six rectifiers may be used.

Secondly, with a highly inductive circuit, the three phase three rectifier scheme is used, Fig. 21. Then the ripples in current are rounded off, taking a shape closely approximating a sine wave. For purposes of calculation, let us assume that the ripple is a sine wave; it will have three times the frequency of the a.c. supply.

In Fig. 35 we have two waves plotted, the upper being voltage, the lower being current, through an inductive resistance. In the oscillogram, Fig. 36, the actual current wave is shown. Now, the current, apparently, consists of the sum of two currents, namely a direct current of value I and a ripple of 3 times normal frequency and of amplitude C.

This current passing through an inductive resistance, produces a voltage as shown by the upper wave, Fig. 33, in which V is the voltage due to the current component I passing through the ohmic resistance, and the superimposed sine wave of amplitude e is due to the current ripple alone passing through both resistance and inductance of the circuit.

The direct current permanent magnet instrument reads the average of a ripple plus any positive unvarying unidirectional current. The average of the ripple lies along the straight line marking off the limit of I (or, in the case of voltage, the line marking off the limit of V). If then the d.c. voltmeter reads V, and the ammeter reads I. The value of

$$\frac{\text{voltmeter reading}}{\text{ammeter reading}} = \frac{V}{I} = \text{ohmic resistance.}$$

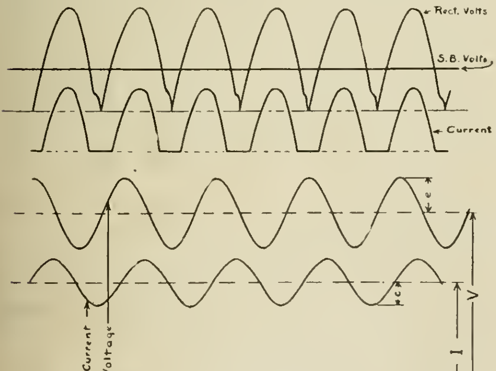
The ripple is automatically entirely eliminated with each instrument.

Mathematically, it can quite simply be proven that the above holds for any case where the ripple is symmetrical about its zero line, independent of its shape or frequency.

This, then is a finer work to which the Tungar rectifier may be applied, and in which results, as checked by actual test, are very satisfactory.

Protection

In Fig. 11, it will be seen that one primary lead runs through to form one of the secondary leads; in Figs. 18, 21, and 30, leads from points on the primary winding form secondary positive leads. The question of protection, therefore, presents itself.



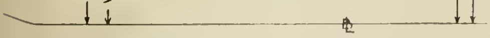


Fig. 34 (above)—Rectified volts, storage battery volts and charging current—Three phase star connection.

Fig. 35 (below)—Rectified volts and current through inductive resistance; plotted, for purposes of calculation, with sine wave ripple.

To handle leads from an underground service transformer is, at all times, dangerous, and particularly so if the operator's hands be wet. In using the tungar rectifier (with autotransformer) ordinary care must be exercised but when charging storage batteries where the operator is liable to have wet hands and, perhaps, be standing uninsulated from the ground, special care is necessary.

The rectifier is a low voltage device, but it should not be confused with other low voltage appliances which draw their power from a strictly low voltage source. Provided the insulation of the supply circuit is good the rectifier is perfectly safe, but when some defect develops in the supply system there is a certain amount of danger.

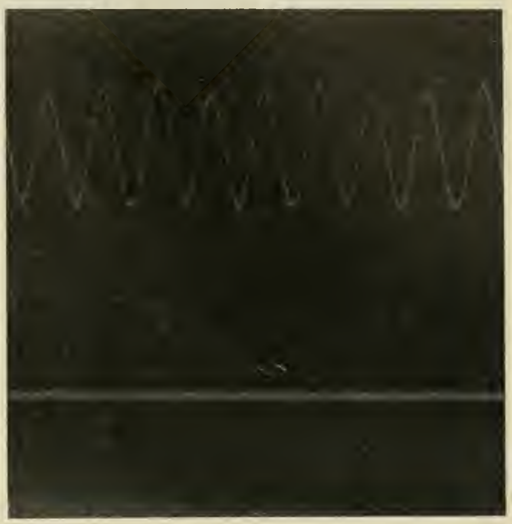


Fig. 36.—Actual current through highly inductive load from three rectifiers, star connected. The straight line is the zero line of current.

After a long illness, Mr. Duncan McDonald, former manager of Montreal Tramways, and inventor of the p.a.y.e. car, died at St. Agathe. He was born at St. Thomas, P.Q., and in his early years was a driver of the old horse cars in Montreal. In 1886 he went to St. Paul and Minneapolis and secured a practical knowledge of the operation of electrical railways. On returning to Montreal he became superintendent of the Street Railway Co., and later went to Paris as engineer and managing director of 500 miles of lines in and around that city. He again came to Canada, and was appointed general manager of the Montreal Tramways Co., a position he resigned in 1912. Mr. McDonald served as controller for the city for two years. He was a member of the Institute of Civil Engineers of France, and of the Institute of Electrical Engineers of Great Britain.

The Principles Underlying Radio Communication—Radio Pamphlet No. 40, issued by the Signal Corps of the United States army. This book points out briefly the basic facts and principles of electro-magnetism and their application to radio communication. These topics are presented in a simple manner so that students with very little mathematical preparation may understand them. Frequent references to standard books are given so that further study may be made of the subject if necessary. The following chapter headings will indicate the scope of the work: (1) Elementary electricity; (2) Dynamo electric machinery; (3) Radio circuits; (4) Electro-magnetic waves; (5) Apparatus for transmission and reception, exclusive of vacuum tubes; (6) Vacuum tubes in radio communication. Bound in stiff, imitation-leather covers, size 4½ in. x 7 in.; 350 pages; 55c a copy.

The Contractor-Dealer

Industrial Illumination—Good Lighting is not an Expense—It is an "Investment" and Yields Big Dividends.

By Mr. Otis L. Johnson*

Illumination, as it applies to industry, has, with the help of science and art, made great strides in recent years.

To-day manufacturing interests everywhere are looking to it to gain assistance in an earnest endeavor to increase production, decrease spoilage, decrease cost, and prevent accident.

Industrial illumination is so important that three states in the United States have already passed lighting legislation; one of these is now drafting more stringent regulations and two other states are now holding public hearings of their tentative Lighting Codes. The fact that five states now recognize the importance of good lighting shows conclusively that other states will follow, and before many years all states in which a large amount of manufacturing is done will also pass laws to protect the employees and aid the employer.

Better factory lighting is needed because it will increase production, decrease costs, improve quality, reduce spoilage, prevent accidents.

In other words, it will conserve the human material in industry—its most valuable asset.

The average time of use of artificial lighting in factories is three hours per day. Unless the working conditions under artificial lighting approximate closely those of daylight, early morning and late evening hours, to say nothing of the loss caused by forcing night shifts to work under poor artificial lighting, all have their effect upon production.

Blindfold a skilled mechanic. How much work can he do? Provide him with poor light and he is able to do some work, but in order that this skilled mechanic may work efficiently and economically he must be provided with the right amount of the proper kind of light.

Light is a tool. Who could expect a workman to properly perform his tasks with poor tools; A man and his machine are a combination, and as such must work together harmoniously. Machine and workman may be the best that money can buy, but poor lighting handicaps the workman; therefore the combination cannot work at highest efficiency.

Furthermore, working conditions have their bearing upon home life. Cheerful, contented workmen carry that spirit home, while a man made grouchy by headaches from eye strain produced by glaring light sources, is very apt to encounter domestic difficulties. When this happens the man cannot go back to work the next day in the proper frame of mind to work at highest efficiency. Here again the manufacturer loses by not providing a properly designed system of illumination. Good lighting makes more cheerful workmen, who labor at increased efficiency because they are better able to see the task they are performing, and because of good light they have more inclination to do good work. All of this tends toward the increased production which is so important at this critical period, and which every manufacturer is trying to obtain.

Improved quality and decreased cost per unit of output is just as important as increased production. It will not be denied that a workman can produce better goods when he is able to see distinctly and with comfort the piece upon which he is working. Spoilage means a heavy dollars and cents loss. It means the loss of raw material and also the cost of labor uselessly expended. A few years ago a United States census report stated that out of $150,000,000 spoilage in the United States during the year, $28,000,000 was due to poor light. The amount would be larger now on account of the increase of production in the last few years, but the ratio would be at least as great.

Accidents cause suffering; they also cause loss of time already paid for by the employer; they lessen production; and many accidents are demoralizing to the entire working force. The employer bears the brunt of most of this loss, and also the loss due to the compensation which must be paid to the injured workman. **Seventy-five per cent. of industrial accidents occur during hours of darkness or semi-darkness; more than one-fourth of these can be prevented by the installation of properly designed lighting systems.** It is the duty of every manufacturing institution to provide artificial illumination which will prevent expensive and distressing accidents. This is not an academic question. These statements are conservative when viewed in the light of the facts as they are reported by eminent investigators and supported by repeated and authentic experiments.

The result of increased production, improved quality, decreased cost and fewer accidents is larger dividends. It is the prime purpose of every plant to earn as much profit as possible; in fact, that is the reason for its existence; therefore, the manufacturer who neglects to furnish dividend producing illumination is taking hard cold cash out of his own pocket to pay for his negligence. It is not possible to lay down definite rules by means of which proper lighting could be installed to cover all conditions, but certain fundamental principles may be stated, principles found in all good lighting.

These are: Correct intensity, good diffusion, light from proper direction, absence of drop cords, absence of glare (both direct and reflected).

In all lighting legislation which has been enacted the amount of light or intensity has been stated as a part of the law. No one who had given the matter any thought at all would expect a piece of work to be performed economically and efficiently under 25 per cent. or even 50 per cent. of the correct amount of light.

The National Electric Light Association, the Society for Electrical Development, lamp manufacturers and reflector manufacturers, all publish authoritative tables which give the correct intensity of illumination. These tables usually refer to the kind of industry, the character of work, and give the correct amount of light necessary under average conditions. Of course, it must be understood that colors of machinery, walls, posts, etc., affect the intensity, and if these are dark, lamps of greater wattage must be installed to obtain the correct illumination.

The elimination of sharp, contrasting shadows is important. This is accomplished by means of diffusion, and can be brought about in several ways, such as; the use of large reflecting surfaces; designing a system so designed that the light from many reflectors falls on the spot in question; the obstructing of the direct rays of light by means of some opaque or translucent material.

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*Illuminating Engineer Benjamin Electric Mfg Co., Chicago

It does not require argument to convince anyone that a workman cannot work efficiently when standing in his own light. For this reason it is highly desirable so to locate lighting units that no matter where machines or benches are located they will receive light from the proper direction. The proper location of light sources will have the effect of eliminating undesirable shadows.

Drop cord or localized lighting must be used sometimes, but the need for it is so small as to be almost negligible. Its advantages are very few and unimportant, while its disadvantages are so numerous and important that the first should be given little consideration.

Guard the Eyesight

The workman should not be allowed to control the position of the light or lights near him for the reason that he does not usually understand or believe that incorrect light can damage his eyesight, and the time that he occupies in adjusting his light is unnecessary because he does not understand what to do. It is therefore wasted time from the standpoint of the employer.

An important argument against the drop cord or localized system of lighting is glare. Glare has been described as "Light out of place." It can and does do more harm than any other part of a poorly designed system of lighting. Glare must be avoided, for the safety of the eyes is as important as the safety of limb. The danger of mechanical injury to the eyes is recognized by most employers and employees, but very few are aware of the harm done by poor lighting.

Impairment of vision is a slow process, and it may take months or even years before the individual is aware of it. Nevertheless, while the impairment is taking place, he is suffering ocular discomfort and his efficiency in his work is decreasing. A great many workmen seem to be drawn toward bright lights and they act as if they believed that the more light they allow to strike their eyes the more they have on their work. This, of course, is not true. Even when reflectors are provided for drop cords (which is infrequent) the workman usually adjusts it so that the light strikes his eye, and even if he does protect his own eyes the chances are very strong that he forgets the man near him and so arranges the light that it enters this other workman's eyes.

Under the factory conditions mentioned above, we have somewhat the same effect when the light is so situated that it shines directly into the eyes of the workman. When a bright light is held continuously in the line of vision, it tires the eyes just as the glare from snow on a sunny day half blinds one. In order to rest the eye, the workman will turn his head toward a spot which is not so highly illuminated. After he does this the muscles in the eye relax and allow the pupil to enlarge. The workman then bends again to his task, whereupon the pupils contract on account of the glare.

This process may be repeated again and again with the ultimate effect that he has greatly reduced ability to see clearly. There is a conscious or unconscious effort to obtain clearer vision. When this effort is maintained for some hours it unfailingly results in great eye fatigue and with it comes a general indisposition to work, with a possible chance for severe headache.

Certainly no one can expect that workmen can be efficient under the conditions we have described. Aside from the question of efficiency and production, which are desirable things for the manager of an industry, it is far from humane to force the workman to strain his eyes, and jeopardize his usefulness and health, under such conditions.

By carefully designing the lighting system so that all these principles are correctly involved the resultant illumination will increase production, improve quality, decrease cost, prevent accidents, and result in an improved morale.

Glare may not only be obviated, but be controlled by the use of reflectors, just as the nozzle of a hose controls the flow of water. The shape of the distributor of light depends upon the finish of the reflector, and upon the position of the lamp filament relative to the reflecting surface. The reflecting surfaces usually employed in factory lighting are:

Porcelain Enamel

For general all-round efficiency and economy the porcelain enameled surface is best. Its initial cost is more, but its cost of maintenance and upkeep are less than any of the other finishes; therefore, it is cheapest in the end. It does not discolor or blister because of heat; it is restored to initial efficiency by cleaning; it is impervious to gas, smoke or acid fumes. Being practically opal glass fused upon steel, it has to be treated with some care, because abuse will chip it. Light reflected from this surface is largely diffused.

The mechanical strength of porcelain enamel depends upon the ingredients which go into the making of it. Enamel can be manufactured which has a very high reflecting power, because it is very white, but the enamel will chip easily on account of its brittleness. Enamel which has a distinctive bluish color has a low reflecting efficiency, but it is tough. The enamel which is used on our reflectors is compounded so that it gives the maximum reflecting efficiency consistent with the toughness of the enamel.

Paint Enamel

The distribution of light about paint enamel, when new, is practically the same as that of porcelain enamel. It does not resist smoke, gas or acid fumes; it discolors on account of the heat of the Mazda "C" lamp, and the dirt rubs into it instead of off, when an attempt is made to clean it. For this reason it has to be repainted frequently, thus making it expensive in the long run.

Matt Aluminum

Light can be controlled by means of aluminized reflectors much more readily than with either the porcelain or paint enamel, and in some places this type of reflector has to be used in order to obtain the proper distribution of light, but all the disadvantages named against paint enamel apply to this matt aluminum surface, and make it expensive in the end.

Mirrored

Mirrored glass reflectors are far from economical for industrial lighting. The mirrored surface is on the back of a glass form, and the light from the lamp has to pass through this same layer of glass before it is projected to the working plane. Even when the reflectors are new there are two absorptions of light on account of two thicknesses of glass. Heat and age cause this glass to cloud, a condition which results in more absorption.

Then, when the reflectors become dirty, light has to pass through a layer of dirt and a layer of clouded glass to the reflecting surface. Then it has to penetrate back through a layer of clouded glass and a lawer of dirt on the return trip. It is easily seen that the absorption in this case would be high. Glass reflectors are, of course, easily broken and the reflecting surface peels off, hence the upkeep expense of this type of lighting would be exorbitant.

Mirrored reflectors are usually deep, and the claim is made that they hood the lamp, In other words, the angle of cut-off is large, but the boosters of this type of lighting equipment have failed to recognize the fact that the mirrored surface back of the lamp is almost as bright as the filament itself; therefore, the angle of cut-off is small.

The proper reflector and lamp to fit the conditions that exist on each individual job when used according to the fundamental principles of illumination will result in:

(a) Reduced eyestrain;
(b) More cheerful surroundings;
(c) Less fatigue in performing work;
(d) Better order and neatness in shop;
(e) More effective superintendence and management.
(f) Approximately 12 per cent. increase in production;
(g) Approximately 25 per cent. reduction in preventable accidents.

The cost of installation and up-keep of a properly designed lighting system is extremely low when one considers the benefits. This cost amounts to approximately 1 per cent. of the average workman's wage. This is insignificant when compared with the extra dividends of increased production. The cost of spoilage and accidents should be added to the lighting bill of the poorly lighted plant, and then the difference in first and up-keep costs of the good and bad systems are in favor of the properly designed system.

Good lighting is not an expense, but instead, is an investment which pays large dividends.

How I Increased My Sales 100%

The eternal household question is that of "servants" More and more it is becoming apparent that the average home must do without them and in proportion as the human race resigns itself to this condition it comes to realize that the next best thing is "electric service." Of course it doesn't exactly mind the children while the mother attends the afternoon tea or theatre performance, but aside from that, generally speaking, what doesn't it do ? And even the electric housewife leaves her children at home alone with a much easier conscience knowing that the chances of mishap are minimized by the absence of poisonous gases and matches.

And now as a substitute for that "rara avis," the sew-lady, the sew-motor is coming forward and saying "Just a little pressure with the foot and I'll do the rest. And you won't need to wait for me three weeks before I can give you a day or half-day—as a special favor." Just at the moment it looks as if this sew-motor will become almost as popular as the electric iron and special sale campaigns are yielding very satisfactory results. Such a campaign is outlined below. It is described by the Society for Electrical Development as follows:

How One Dealer Does It

Perhaps the best way to point the way to sew-motor selling is to tell how one dealer does it. This dealer picked a well-known make, enlisted the full co-operation of the progressive manufacturer and jobber, and set a definite time for his campaign—one week. He called it "Sewing Economy Week" at ——, and laid out his campaign about on this basis:

First:—Being experienced, he planned his campaign down to the smallest detail before setting it in operation. He placed a sewing machine in his window, connected up with a sew motor and ready to run.

Then he carefully explained the operation of the sewing machine and sew motor to his errand boy, a bright youth in knickers. And he persuaded him to agree to sit in the window and operate the equipment.

Near the machine he placed a 40-watt lamp arranged so that its light was reflected upon the machine and the boy From the lamp he suspended a placard which read:

> **The Sew Motor uses just as little current as this 40-watt lamp—they're both economical."**

On the background of the window appeared a large placard reading:

> **"Even 'mere' man can sew the sew-motor way —Look! It's Easy—Comfortable—Cheap! Sews ¼-million stitches for one cent. Come in!—Miss Worth will tell you all about it!"**

The boy was supplied with a series of cards which from time to time he held up and prompted observers to read. [Note: A girl will do as well, and placards can be changed accordingly.]

Among the cards were some which stated facts and figures showing the advantages and economies of Sew-Motoring.

But realizing that a boy could go to lengths that would be in bad taste for an adult, he took advantage of the opportunity to make the display distinctive by injecting a little humor into it. He supplied the boy with some cards in a lighter vein and that were to be interspersed with the showing of the more matter-of-fact ones. They read:

> **"If you must pedal, get a bicycle. But when you sew—well, come in and Miss Worth will show you an easier way."**
>
> **"If I can do it, think what you girls could do! It takes us men to find the easy way. Come in and Miss Worth will tell you all about the sew motor "**
>
> **Sister Susie says she won't marry her beau unless he promises to get her a Sew Motor. She's smart. But it's never too late to get a Sew Motor. Come in and ask Miss Worth."**
>
> **"Women do grow older—but those who sew the Sew Motor way never look old or tired. Want to stay young ? Come in."**

Second: A section of the store was screened off and equipped to suggest a sewing room. The demonstration was in charge of a capable woman operator.

Third: A series of advertisements was planned, featuring the demonstration and inviting housewives to bring their sewing to the store and have it done the Sew Motor way.

Fourth: A girl was set to work getting the names, addresses and telephone numbers of housewives from the telephone directory, classifying them according to streets.

Fifth: A saleswoman was secured who had a good telephone voice—clear, well modulated and with a "smile" in it. Then she was drilled in a neat telephone solicitation designed along lines laid down in the Society's Special Service entitled, "'How to Promote Business by Telephone."

Sixth: Anticipating that not all women who received a telephone invitation to bring some sewing to the store and have it done the Sew Motor way would be able to do so, arrangements were made to have a salesman display the motor to all such housewives in their homes.

Then, having everything provided for, the campaign was begun.

Advertising Arguments

Among the arguments used in his advertisements were these:

Inherent disadvantages of ordinary sewing machine for the housewife in the small apartment: Foot work is necessary to operate the needle and the machine is nearly always in the way.

Reasons why women buy the portable electric machine: (1) "I can put it away out of sight. (2) I can move it myself from room to room. (3) It is such a convenience to be able to sew where the light is good in any room." (4) The health reason: "My doctor won't let me run my old machine any more."

Old machines have been given to the Red Cross and they in turn buy motors to operate them. Thousands of garments were turned out of Red Cross rooms with no fatigue to workers.

Selling points: "There is nothing mysterious about the little Sew Motor which does all the hard work. There is no confusion, no having to remember this or that; it is the way the old machine has always been controlled only the treadle now is a sort of foot rest. Hands do the same thing they always did. They guide the work, nothing else. The motor does it all."

With an electric sewing machine, four times as many garments can be made with less fatigue—as treadling is eliminated. The electric sewing machine makes 800 to 1,200 stitches a minute—works four times as fast as a good operator using a foot powered machine.

Going away in the summer, it is possible to check the portable electric sewing machine the same as other baggage and have the machine to use during the summer at hotel or country place. It can be taken about in an automobile, if desired.

A motor for the old machine is one of the greatest household helps designed to bring comfort to the housewife. A big day's sewing can be done in a few hours without fatigue. She can sew by the window, outdoors on the porch in summer, by the fireside in winter, wherever there is an available socket.

Farm Labor—His Problem and Your Opportunity

By Fred B. Raymond*

When the short-sighted business man reads in his evening paper that wheat is selling at more than $2 a bushel, he groans because the price of bread is high.

When a far-sighted business man reads about the 1,000,000,000 bushel crop of $2 wheat, he begins to figure out what he can sell to the farmers who have all this money in their pockets.

As a class, the richest people in Canada today are the farmers, and they are going to get richer each year for the next five years (barring serious crop failure) because it is going to take five years to get the world back to normal agricultural production.

But with all their prosperity, our farmers face a great and growing problem—the problem of labor. How will that problem be solved?

Obviously by labor-saving machinery, by the farm tractor and the farm electric power plant.

The first of these solves the labor problems of the field—the plowing, harrowing, seeding, cultivating and reaping.

The second solves the labor problem of the home and farm buildings—the washing, ironing, separating, churning, grinding, feed cutting, wood sawing, pumping, threshing, stacking, repair-shop work, and the thousand and one chores formerly done by the housewife and the hired help.

Nothing can be plainer or more obvious than these two facts. The farmer must have labor-saving equipment, and he has the money to pay for it.

What are you going to do about it? Are you going to sell farm power plants? Or are you going to complain that agents who do sell them are "stealing" your business? Are you going to reach outside your town limits for farm-wiring business? Or are you going to allow someone else to have it—or worse, allow the farmer to put in his own equipment?

Are you going to advertise and sell appliances suitable for farm use? Or are you going to literally force the farmer to buy appliances from peddlers or by mail? It's up to you.

Many men commit the error of thinking that a dealer must be in a "farming community" to sell goods to farmers. This is only half true.

Within an hour's automobile ride of any of our largest cities there are many hundreds of farms that cannot be served by central stations.

Nose around a bit and you will find a big prosperous farm implement concern in every metropolitan centre.

Go deeper and you will find an up-and-doing tractor agent with probably more business than he can take care of.

Pick up the telephone directory and you will locate the man who is getting rich right now by selling farm power plants.

The modern farmer doesn't hitch up the old gray mare to a springboard and drive to some little crossroads community twice a season—not any more. He slides in behind the wheel of an auto and honks to the big city at least once a week.

They come by hundreds into any centre you may mention—by auto, by interurban trolley and by train.

Without doubt perhaps the most important and timely message to the electrical trade can be summed up thus:

The farmers need farm power plants, wiring, accessories and appliances, because farm labor is their problem.

They have the money in pocket to pay for them.

They do not necessarily restrict their purchasing to rural communities, nor to agents who drive to their doors.

They are, as a class, ready to do business on a business basis with anyone who earnestly and intelligently tries to do business with them.

Farm power plant selling is not what even an enthusiast would call easy. It takes brains, equipment and the hardest kind of work.

Farm wiring jobs do not wander into your shop unchaperoned. They must be fished for with the right bait and tackle. Incidentally, the man who seeks such business must consider carefully what policies will win the co-operation of agents who are selling plants and who consequently control many of the wiring contracts.

Farm appliance business is not non-competitive. Low-voltage flatirons, incandescent lamps, vacuum cleaners and the rest are peddled through the country from flivvers and are delivered by parcel post on every rural mail route.

Do these difficulties, does this competition, discourage you?

Then do not complain of agents and the catalog houses, If they are smart enough and aggressive enough to get the business, and if the electrical trade cannot grasp the opportunity, it is our own fault.

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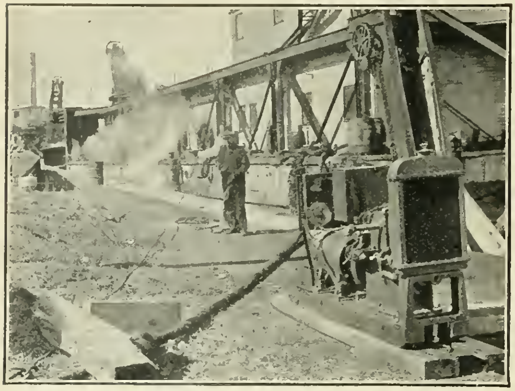
*From Electrical Merchandising

Meter with Cast Winding

A new type of rotor with cast winding which has been recently designed by the General Electric Company, Schenectady, N. Y., presents new features and improvements worthy of brief description. The bars and short-circuiting rings comprising the windings employ the same material and are cast in a single operation. With the windings thus made a solid unit, rigidity, durability, and better balance are procured. The cast winding from an electrical point of view also insures uniform cross section and union between the bars and the end rings. This has become a factor in eliminating operating difficulties due to open-circuiting of joints between bars and rings. Holes bored radially through the cast end rings give effective ventilation for rotation in either direction. The new cast winding rotor is said to be especially effective on induction motors of the "Squirrel cage" type.

Lincoln Arc Welder

The larger cut of the two shown herewith is a reproduction of a photograph of a gasoline-driven welder, handled by the Lincoln Electric Co. The engine is a four cylinder Winton, with automatic speed control, and the generator is the regular type, as furnished on Lincoln Electric Arc Welders, which supplies a direct current available from 50 to 150 amperes with an available voltage of from 50 to 15. This particular machine is carried on a Chalmers Truck and represents part of this company's equipment for doing ordinary work, such as repairs to boilers, tanks, etc. This picture was taken just previous to the outfit leaving under its own motive power for Port Dalhousie for use on government barges. The smaller picture shows the machine after it was unloaded from the truck and at work. For a short job the truck would be run right up to the work and the job completed without unloading the Welder.



The Lincoln Welder at Work

Hamilton Electrical Association

The Hamilton electrical contractors and dealers held another of their successful meetings on Wednesday evening, May 7th, in the Royal Connaught, the president, Mr. Stalford, in the chair. The chief business of the evening was a discussion of the question of forming a branch of the recently formed Ontario Association and the final vote was unanimous in favor of this course.

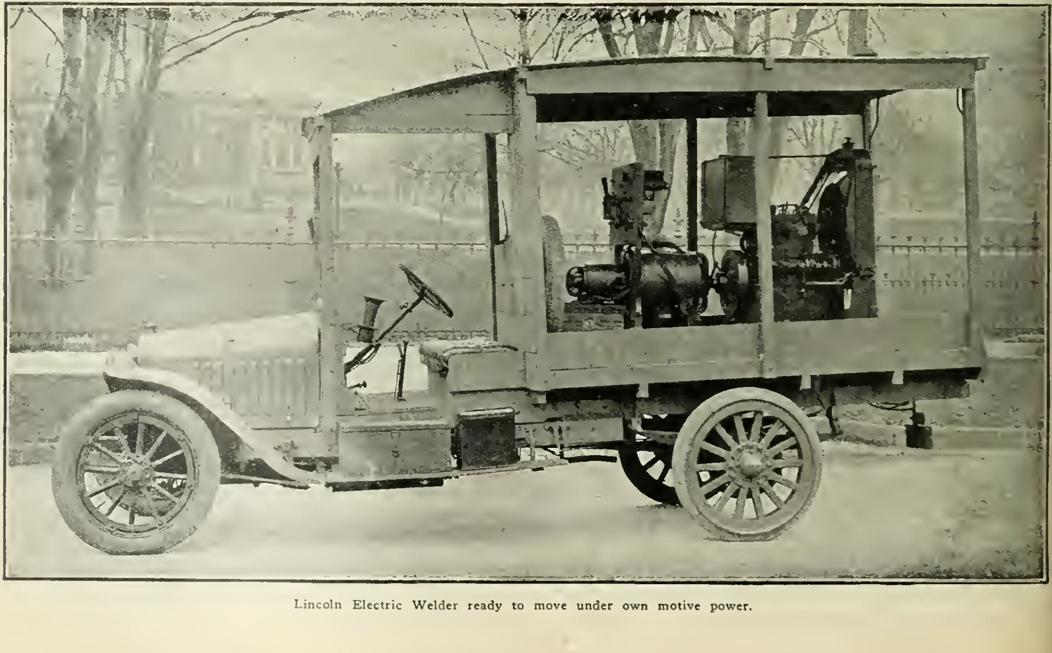
Mr. Kenneth A. McIntyre, president of the Toronto branch of the Ontario Association of Electrical Contractors and Dealers and provisional chairman of the Ontario Association, along with the executive of the Toronto Association, was present to take part in the discussion. Mr. McIntyre explained at length the scheme of provincial organizations, which consists in dividing the province into about seventeen districts. Each district will elect a representative to the provincial executive which in turn will elect a president who may or may not be one of these elected members. The Ontario Organization will thus operate under an executive control of a president and seventeen executive members.

The outlines of the district of Hamilton were discussed at this meeting and, subject to arrangement of minor details, were arranged. Transportation facilities and inspection boundaries are two factors that must influence decision in this matter.

The members at the meeting also discussed with the Toronto members the advisability of adopting the Open Price Plan of exchanging tenders. The Toronto members explained the working of the system as they had found it to date. A committee was finally named to make arrangements to set the plan in operation not later than June 1st.

The Conference Committee of the Hamilton Association recommended that the working rules be adoptetd and become effective on May 1st, 1919. In accordance with the working rules, a conference committee and the members of the joint examining board were appointed.

A number of members of the Brantford Association were present to take part in the discussion, including the presi-



Lincoln Electric Welder ready to move under own motive power.

dent, Mr. Henderson. At his invitation Mr. McIntyre will go down to Brantford in a few days to discuss with the Association there the advisability of making Brantford the centre of another district—which will elect a representative to the Ontario executive. It is expected too that the Brantford members will adopt the Open Price Plan.

Toronto Contractors' Monthly Meeting

The Toronto electrical contractors held their regular monthly meeting in the King Edward Hotel on Friday evening, May 8. The chief item of business consisted of a discussion with Mr. Gunn, representing the Labor Union, of the standard of wage during the coming year. During the past couple of years the contractors have been endeavoring to build up a spirit of co-operation between the employer and employee, and it was the understanding that Mr. Gunn would come to this meeting prepared to discuss ways and means in an effort to arrive at an amicable basis satisfactory to the workman and the contractor alike. It came as rather a shock, therefore, that Mr. Gunn presented an ultimatum of 75 cents or strike. It is unfortunate that the Labor Union has taken this uncompromising attitude. If they are in the right they had nothing to gain by it, as an open discussion would have proven this fact. At the moment it looks as if it would take some time before the two parties could establish themselves again on the friendly relations existing in the recent past.

Mr. Gunn was somewhat late in arriving and in the interval discussions centered around the open price plan. Mr. McIntyre, the president, announced that a meeting of the members who are operating on this plan would be called in the near future.

The Booth-Hall Company, designers and builders of electric furnaces, announce the removal of their executive and sales offices to Room 1007-1008 Hearst Building, 226 West Madison Street, Chicago. This change was necessitated by new arrangements made in connection with the manufacture of their electric furnace equipment. Increased facilities for turning out standardized furnace equipment have been provided with a large manufacturing company located in Chicago.

The Van Dorn & Dutton Company, Cleveland, Ohio, manufacturers of gears, have opened branch offices at New York and Chicago. At both cities it is their purpose to specialize in gears and pinions for electrical work. Mr. Harry F. Keegan, formerly with the Chicago surface lines and well known in the electrical railway field, will manage the Chicago branch with offices at 1241 First National Bank Bldg. His brother, Mr. John Keegan, who will manage the New York end, with offices at Room 317, 30 Church St., comes from the Interboro Railway.

The Ohio Brass Company have sent out announcements of a change in their Chicago office, in effect May 1, 1919. The new office will be at 12t7 Fisher Bldg., 343 South Dearborn St.

The Canadian Drill & Electric Box Company have just installed a well equipped galvanizing plant. It is the intention to have all their products galvanized so that they will withstand acid and other deteriorating agents. The process has been approved by the Hydro-electric Power Commission.

A newspaper report states that a complete automatic telephone system is contemplated for the city of London, England, the cost to be in the neighborhood of $35,000,000.

Agency for Condor Lamps

W. A. Hall & Co., 164 King St. W., have taken over the agency for Condor lamps.

Personal

Mr. C. H. Keeling, District Sales Manager of the Square D Company, has just returned from a six weeks' trip covering Western Canada through to the Coast. Mr. Keeling states that he saw evidence on all sides that electrical contractors throughout the West have greatly improved their merchandising policies. He noticed a marked change in the way of clean windows, finer window displays and neater stores.

Mr. L. M. Cochrane, who has been associated with the Northern Electric Company Limited, in Calgary and Winnipeg for the past eight years, has resigned his position of District Sales Manager of the Winnipeg district, to enter into business for himself. Mr. Cochrane is opening a sales office in Winnipeg which will be his headquarters, and will represent manufacturers of electrical and automobile accessory products. He will cover the western territory from Port Arthur and Fort William to the Pacific Coast, and will work with jobbers and distributors exclusively. Mr. Cochrane is visiting manufacturers in Eastern Canada and the United States completing arrangements in connection with his business, and expects to open his office about June 15th.

Mr. Edgar T. Driver, who recently arrived from England on the C. P. R. steamship "Melita" to take up a position in the Toronto office of the British Aluminium Company Ltd., is a graduate in electrical engineering of the Northampton Engineering College in London. Not only does he hold the E. E. degree of this college but also the B. Sc. honors degree of London University. Mr. Driver is the author of one or two treatises on dynamo and motor design but more latterly has been making a special study of transmission line conductors and his name will be familiar to readers of the "Electrical News" as the author of several articles on the subject with special reference to the characteristics of aluminium and aluminium-steel cables. For the last few years he has been serving with the Royal Air Force in France but has been demobilized in time to take part in the increased commercial activity of the British Aluminium Company and is joining their Canadian Head Office as technical expert.

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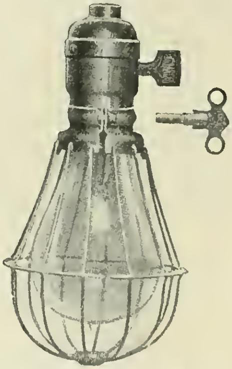

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Current News and Notes

Marysville, N. B.

The town council of Marysville, N. B. , have under consideration the construction of a transmission line approximately 9 miles long. It is understood the material will be purchased and work done by the town.

Montreal, Que.

It is announced that the Shawinigan Water & Power Company will open an office in London, England, for the further sale of the products of their subsiduary companies.

The name of the Crown Electric & Supply Company, Montreal, has been changed to the Montreal Crown Electric & Supply Company. Mr. Wm. Flood is the proprietor.

Morden, Man.

The ratepayers of Morden, Man., by a vote of 71 to 7, passed a by-law authorizing an expenditure of $15,000 for improvements to the lighting system.

Ottawa, Ont.

The Central Electric Supply Company have opened a branch in Ottawa under the name of The Bank Electric Supply Company.

Penticton, B. C.

An electric railway is being spoken of between Penticton, B. C., and Oroville, Wash., a distance of about fifty miles. Power for the line would be secured from the West Kootenay Power Company.

Port Elgin, Ont.

The Associated Municipalities of Northwestern Ontario is the name of a new organization formed at Port Elgin for the purpose of endeavoring to secure a supply of Hydro power in a territory some 75 miles in length comprising 33 municipalities. This district extends from Southampton to Wingham and across to Mildmay . Delegates from the various municipalities were called to Port Elgin by the Board of Trade.

Teck Township, Ont.

A by-law was submitted on May 9th on the question of building a transmission line through Teck Township to secure a supply of power from the Northern Ontario Light & Power Company of Timmins, Ont.

Toronto, Ont.

The council of the city of Toronto have rescinded their action of last year in giving notice to the Toronto Electric Light Company that on the expiration of their franchise the city would exercise the right to purchase the company's holdings.

Winnipeg, Man.

The Manitoba Electrical Association was recently formed for the purpose of boosting the electric idea. The officers are: Mr. G. L. Guy, of the Manitoba Public Utilities Commission, president; Mr. J. M. Leamy, provincial electrician, vice-president and Mr. M. E. Deering, of the Northern Electric Company, secretary-treasurer.

Trade Publications

Plugs and Receptacles—Folder by the Harvey Hubbell Company of Canada, illustrating various types of their standard products.

The Electrical Alloy Company, Morristown, N. J., are distributing Catalogue No. 9, describing resistance materials and Grade "A" "Monel" metal; pure nickel, spark-point nickel, wire, ribbon, strip, rods and all other electrical alloys manufactured by this company. Mr. A. D. Stevenson, formerly with the Northern Electric Co., sales manager of the company, is covering Canada regularly.

POWER CABLE

350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

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Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

COMPETENT DRAFTSMAN and Machinist with experience, studying Electrical Engineering, desires suitable position. Three years' military service overseas. W. A. Plant, Hastings, Ont. 10

ELECTRICIAN experienced in the maintenance and operation of Hydro Electrical plants, motors, etc., wants position as operator or maintenance man, the latter preferred. Apply Box 935, Electrical News, Toronto.

AN ELECTRICAL AND MECHANICAL ENGINEER with extensive experience is open for engagement in steam, hydraulic and electric power plant; design, construction, operation and management. Factory engineering and management and waterworks design. Apply Box No. 938 Electrical News, Toronto. 10

Representation Wanted

Manufacturer of Alternating Current motors wishes active representation in Toronto and vicinity. Box 936, Electrical News, Toronto. 10

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Central Station Promotes House-Wiring Campaign

The Public Service Co., of Northern Illinois, is exerting every effort to stimulate activity in the wiring of houses located in its territory. This company serves a rather prosperous district in northern Illinois including the suburbs of Chicago and, although the percentage of houses wired in this district is much higher than the average, it is expected that through the efforts of the company and the co-operation of the local contractors the number will be materially increased.

The company for some time has had a two-year time payment plan for wiring in effect and has been co-operating with the contractors by allowing them to take contracts on this basis and purchasing such contracts from them. During the campaign this plan will be given wide publicity. In addition, in those parts of its territory where the company does not maintain a construction department, solicitors will be engaged to canvass the locality for the local contractors.

In the April Sales Bulletin of the company the importance of providing adequate electrical installations is strongly urged. Comparing the modern house-wiring installations with the automobile refinement, it states: "If the public knew no more about automobile refinements than it does about electrical conveniences, automobiles would be sold minus lamps, starters, tops, windshields and tools, and would be equipped with undersized tires and one-cylinder engines. They would run, but that's all. Most house-wiring jobs give light, but that's all."

This lack of realization of electrical refinements is laid to the fact that the customer is usually buying electrical work on a price basis only and no attempt is made to point out to him the great advantages of oversized wiring, especially feeders, plenty of flush receptacles, switches, additional and emergency lighting outlets and other electrical conveniences and seldom is informed of the advantages of the many electrical appliances. It is pointed out that electric service today means more than the lighting of the home and the company's salesmen are strongly urged to advocate the installation of these electrical convenience features and the use of electrical appliances as much as possible.—Electrical Review.

Increased Manufacture of Electric Heaters in Sweden

The use of electricity for heating purposes is comparatively new, but since the enormous water power in Sweden and Norway has been increasingly utilized, and especially because of the acute shortage of fuel during the war, electric heating has become more and more extensive in Scandinavia. Elektriska A. B. Volta was organized in Stockholm in 1915, with a capital stock of $32,160, for the manufacture of electric heating apparatus. In the beginning this factory employed 40 men, but at the end of 1917 the number had increased to 500.—Electrical Review.

World's Smallest Turbine

What is believed to be the smallest operating turbine ever built has been completed by Ivan T. Nedland, Hillsboro, N.D. Mr. Nedland also built the smallest electric motor and the smallest steam engine in the world, these being on exhibition at the Panama Canal Exposition in San Fransisco and also at the University of North Dakota. The turbine is smaller than either of the other small devices. The rotor is made of steel and has six slots. The diameter of the rotor is 0.032 in. and the shaft is 0.007 in. in diameter. The weight of the rotor is 2 mg. The diameter of the complete turbine is 0.048 in., or about one-half the diameter of an ordinary pin head. The complete turbine weights 12 mg. The turbine will not run with steam as that fluid is too heavy for it to heavy for it to operate on. It is mounted on a hollow pedestal so that an air hose can be attached to the bottom. It will run at vary high speed when air is applied. The casing of the turbine is made of gold. The complete machine consists of eight parts. It is kept in a glass case so that moisture, which would affect its running, will be excluded.—Electrical World.

Electric Heaters For Railroad Tracks

During the heavy snowfall last winter a somewhat novel form of electric heater was devised for use on certain British railways for keeping the points and switches free from frozen snow and ice. The heaters consisted of a length of resistance wire wound on a porcelain tube. This latter was centered between insulating disks and placed in lengths of 2½-in gas pipe. These tubes were about 1½' in length, and these somewhat rough and ready heaters were coupled up to lengths of ordinary rubber-covered wire and laid under the points to be protected. As soon as the current was switched on the snow naturally began to thaw and very satisfactory results were obtained.

Similar heaters have been in use on railroads in this country for some years, being brought out for service when snow begins to fall. The heaters take 11 amperes at about 36 volts, and for ordinary work they are used three in series across a 110-volt circuit. It has been found necessary to use 18 heaters for the turn-outs, and these simple but efficient appliances have been employed in large numbers under pipe runs, near signal mechanism and in the vicinity of the gearing for turn-table pits.—Electrical Review.

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2	52	3	25	550	720	Lancashire
	50	3	25	550	720	Westg.
2	40	3	25	550	710	Westg.
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	8	25	550	720	Westg.
1	25	3	25	550	1440	J. & M.
1	25	3	25	550	725	Westg.
1	25	3	25	550	720	Lancashire
1	20	3	25	550	1440	J. & M.
1	20	3	25	550	750	C. G. E.
1	20	3	25	550	710	Westg.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	15	3	25	550	710	Chap. & W.
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	J. & M.
1	7½	3	25	550	1500	Lang-Dav.
2	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
4	4	3	25	550	1400	Excelsior
2	3	3	25	550	1500	C. G. E.
4	3	3	25	550	1400	Excelsior
1	2	3	25	550	1440	Excelsior

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Vol. 23 Toronto, June 1, 1919 No. 11

Electrical Engineers to Form Canadian Institute

There is more than usual interest attaching, at the moment, to the question of whether the electrical engineers in Canada shall form themselves into a Canadian Institute of Electrical Engineers or whether they shall merge their identity in the organization which, until recently, has been known as the Canadian Society of Civil Engineers and is now called the Engineering Institute of Canada. The new name would indicate the intention that all branches of engineering should be included in one large and more comprehensive organization, but beyond the change in name there is little evidence that the personnel of the Engineering Institute of Canada is different from that of the Canadian Society of Civil Engineers. This view is borne out by the fact that neither the Society of Mechanical Engineers, the Society for Chemical Industry, the Canadian Mining Institute, Canadian branches of the American Institute of Electrical Engineers nor the Municipal Association of Electrical Engineers have looked upon the proposition of becoming part of the Engineering Institute of Canada with favor.

So far as electrical engineers are concerned, it is apparently the practically unanimous opinion that their first interest, and duty, lies in doing all in their power to develop the industry of which they form a part It is true there are certain things in common between electrical engineers and other engineers but the relationship is not nearly so close as that between electrical engineers and electrical manufacturers, jobbers, central station men, contractors and dealers. The development of electrical engineering as a profession is tied up hand and foot with the development of these other sections. No one element in the industry can prosper, or even exist, without the others. All these elements are members of the same family—a young one, truly, but growing very rapidly—to which every member must contribute his quota.

What we electrical men need—and we need it very badly—is some scheme of organization which will bring our various elements into close working relationship. We are as yet, so to speak, merely held together by sentimental ties of common interest. Cold business demands, however, that the electrical industry, as a whole should be organized under one general head—it may be an individual or a group of individuals—which shall look upon the whole industry as a unit and administer the various departments impartially, having nothing in view but the highest development of the whole—just as the manager of any private industrial concern co-relates his various departments to the end that the business over which he has been placed may be increasingly prosperous. The easiest way to accomplish this end would seem to be through a common council, containing representatives from all the sections of the industry. This, however, presupposes some corporate body to elect these representatives. There is such a body of electrical manufacturers, of jobbers, of central stations and of contract-dealers. There is none of electrical engineers. Isn't the first logical step the formation of such a body whether you call it the Canadian Institute of Electrical Engineers or any other name?

Large Number of Telephone Conversations on Same Circuit

A few days ago the Canadian Independent Telephone Company staged a most interesting experiment over the Toronto-Dundas telephone line of the Ontario Hydro-electric Power Commission. Due to the operating conditions in this district the ordinary metallic system has become very indistinct and frequently is quite useless, so much so that the Commission is considering the advisability of installing another line.

The experiment was in charge of Dr. Lee de Forest, with Professor Charles A. Culver and his staff of experienced operators, and it was demonstrated not only that the equipment used rendered conversation on this line distinctly audible but that the capacity of the line was already sufficient to carry on a large number of simultaneous conversations. The basis of the success of the test lies in the recent invention of the De Forest "Audion"—an instrument for the production of high frequency waves. A brief resume of the situation will be of interest:

General George O. Squier, Chief Signal Officer of the U. S. army demonstrated at Washington, in 1911, the possibility of transmitting high frequency carrier waves similar to those used in radio telephony over an existing wire telephone circuit. He was able to demonstrate by this means the possibility of carrying on several simultaneous telephone communications without interference and without disturbing the conversation over the physical circuit. General Squier used in this early test a special high frequency alternator which was very expensive to build and required constant attention of a skilled engineer. Moreover, the frequency delivered depended exactly on the speed, and this was a variable quantity which was very difficult to regulate quickly or to keep constant when once set.

This fact necessarily confined the application of the idea to laboratory demonstrations. It was not until the de

Forest Audion (originally developed as a radio detector and later applied as a telephone amplifier or repeater on the long distance lines of the A. T. & T. Co. in the United States) had demonstrated its ability to act as a high frequency generator of waves of absolutely constant frequency—that it was possible to hope to apply the principles of the "wired wireless" multiplex telephone in practice.

The oscillating Audion thus used was called by its inventor, Dr. Lee de Forest, the Oscillion. The Oscillion in various sizes and built for powers ranging from a fraction of a watt up to 1,000 watts or more has enjoyed an enormous application to all problems of wireless communication during the war. Literally thousands of these little high frequency generators have been used by the U. S., British and French Signal Forces, and it is a well known fact that very much of the success which attended the artillery and aviation operations of the Allies can be laid to the door of this little lamp.

As soon as the war was over the telephone engineers began to apply the Oscillion to the question of multiplex telephony according to the Squier inventions. Engineers of the de Forest Company have been pioneers in this application and Toronto has just witnessed an application by these engineers of the oscillating Audion to multiplex telephony.

The demonstration was carried on over a pair of telephone wires belonging to the Hydro-electric Commission extending from the power station at Toronto to that at Dundas near Hamilton, a distance of over 40 miles. The apparatus was arranged at the power stations instead of at the downtown terminals because better facilities for carrying on the experiments were there offered. Tests were made, however, over the three miles of cable extending from the power station at Toronto to the central office of the Hydro-electrical Commission. These tests showed that the presence of the three miles of cable caused no appreciable attenuation to the service, a result which may come as a shock to some of our mathematical telephone experts.

Two complete transmitters and receivers were installed at each end of the line. Four distinct wave lengths or frequencies were employed ranging from 16,000 to 12,000 meters. Additional tests were made using wave lengths of 600, 1,000 and 1,600 meters. Contrary to all expectations, the results obtained with the higher frequencies, (the highest being 500,000 per second), were even better than those one-twentieth as great. The demonstration showed by actual trial that at least seven simultaneous conversations could be carried on without interference of one with any other, and without in in any way disturbing the physical circuit. The existing conditions of the line were not disturbed in any way except momentary interruption while choking coils were being introduced. It was found later that these choking coils were not necessary.

The quality and loudness of the speech left nothing to be desired. Hundreds of conversations were carried on during the time that the apparatus was in use, by visitors who had never seen the apparatus before and knew nothing at all about its manipulation. No difficulty whatever was experienced by these visitors. Simultaneous talking and listening was carried on the same as over an ordinary telephone circuit, no switch-over device being employed to switch from talking to listening. The operation of the system was shown to many leading engineers of Toronto and Hamilton, including representatives of the Hydro-electric Commission.

The success of the demonstration using these extraordinarily high frequencies so utterly new to the wired telephone art, upsets a good many of our preconceived and orthodox notions of the limitations of telephone operation and engineering. Thus it is clear that with no more than two pairs of telephone wires, 60 independent telephone conversations can be carried on without using the ground, and with ground connections six additional circuits can be provided which should be suitable for telegraph purposes. Over each of these latter circuits it would be possible to carry on ten additional telegraph communications suitable for high-speed work. It has been demonstrated that copper wires are not necessary for this form of telephone communication; galvanized iron wires such as are used for ordinary telegraph circuits, answering admirably. There is no question but that most power transmission conductors can be very nicely used for telephone purposes as well.

The results of the widespread extension of telephone and telegraph communication which this new Squier-de Forest invention permits are difficult at this early date to limit or define. The ease with which the wired and wireless telephone systems can be dove-tailed together (so that the permutations possible by an ordinary switchboard can be utilized to interconnect the two systems) assures a very great extension of telephone service throughout the province and throughout Canada. The application of "wired wireless" should also greatly reduce the cost of service, especially for long distance trunk line work. We may now expect that a long distance trunking service will soon be linking up many independent or isolated telephone exchanges, which for many years to come, could scarcely hope to afford the old style long distance communication.

The Metric System—Discussion at a Joint Meeting of the A. I. E. E. and the A. S. M. E. (Toronto Branches) at Engineers' Club Friday May 11, 1919

By Mr. E. V. Pannell[*]

E. F. Burton (Professor of Physics, Toronto University) introduced the subject by a contribution to the origin of the Metric System. The derivation of the meter was due to the action of the French Government in 1793 and in surveying the length of the meridian from Dunquerque to Barcelona it was believed that this value was 1/10 deg. part of the earth's quadrant. The fact that this was found to be slightly in error at a later date did not greatly disturb the value of the system because if all the standard meters were destroyed the value could always be reproduced by a definite wave length of cadmium red light. The decimal system was older than civilization, being derived from the number of digits with which primitive man was in the habit of counting; the metric system carried this step further. One great advantage was the facility of relating weights and measures from the intrinsic relation holding in this system. The volume of a tank of water or oil was its weight and vice versa.

E. V. Pannell (engineer, British Aluminium Co. Ltd.) pointed out that arguments for the English system of weights and measures were not directed against the decimalization or other improvement of the system where it was found desirable. As a matter of fact, the inch had been excellently decimalized in connection with wire sizes and sheet gauges which were always specified by the mil. Nevertheless, the system of successive halving leading to the ¼, ⅛, etc. fractions was in many respects a more natural method and would always hold in certain connections. Since the meter had been proved to be no particular fundamental measure but only an arbitrary one like the yard why not standardize the yard which was about a thousand years older. The Metric System was adopted by the French Government in a time of revolution which also included a ten day week, a new system of months and a 400 degree circle On the other hand, the older units evolved naturally; the

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[*] Secretary Toronto Branch A.I.E.E.

yard being the maximum convenient width of cloth which could be woven and the inch a definite measure of the number of threads also corresponding to the length of the weaver's thumb. The yard is common all over Spain and Latin America and even in Texas as the Vara. The lack of relation between units often urged against the English system was not found any objection in practice. Certainly one litre of water at maximum density and 4 deg. C weighs a kilogram but under the same circumstances a cubic foot of water weighs 62.3 lbs. as every schoolboy knows. The metric advocate might know how many square mm there are in a hectare, but how much better off is he for knowing it. One might as well ask how many circular mils there are in an acre. Both are measures of area but for practical work there is no need for any close relation between them. Regarding foreign trade, letters had been received in answer to a canvass by the A. S. M. E. on this subject and showed that 82 per cent. of the manufacturers had found not the slightest need for the metric system in machinery and other products for foreign markets and only 11 per cent. had found it occasionally necessary.

W. P. Dobson (Laboratory Engineer, Hydro-electric Power Commission) thought that some of the objections against the adoption of the metric system were based upon an immediate change. Necessarily it would have to be gradual and preceded by a period of education. He outlined the excellent system by which the units of the system were inter-related and defined the fundamental units. It is intrinsically a decimal system and the universal tendency towards the decimal fractions gave this the only perfect decimal system a great advantage. The matter of coinage was a great argument in favor of division by ten. This simplicity of the system involved a reduction in the time of school estimated at from 1 to 3 years. The fact which tells most against the older systems is that there are several forms of each unit; different values for the pound, gallon, etc., also the various wet and dry measures, etc. The great advance made by the metric system in only 100 years was evidence of its value. It had been so widely adopted that the nations still working on the English system were in the minority. The metric measure was obligatory in 34 countries and legal in 26. Many firms making machinery, tools, etc., in U. S. regularly manufacture and list goods in metric measurement side by side with the English system. Such important firms as the Baldwin Locomotive Works, Brown and Sharpe Mfg. Co. and American Locomotive Works are among these. Outside the field of manufacture the Wholesale Grocers' Association had brought in a resolution in favor of the change of system.

C. G. Spencer (American Society of Mechanical Engineers) had come into considerable contact with the metric system in Latin America and was surprised to find how much the English system was still used in engineering work. He found that the difficulty about the correct location of the decimal point was not exaggerated and a great number of mistakes was due to this course. The use of feet and inches provided a safeguard against this because the units are so different.

E. T. J. Brandon (Engineer, Hydro-electric Power Commission) was convinced of the advantage of a decimal system of coinage from recent experiences in England and Sweden where he found it much easier to calculate currency in the latter country. He thought that the objection mentioned by Mr. Pannell to the great variety of pipe fitings required during a transition period could be simplified by the adoption of a metric-English union.

W. F. McKnight (Northern Electric Company Ltd.) believed that a standard system was greatly needed on connection with the size of wires and cables. There were at least ten different wire gauges in common use.

H. W. Price (Professor, School of Practical Science, University of Toronto); Perry A. Borden (Meter Engineer, Hydro-electric Power Commission) and W. F. Sutherland (Editor, Canadian Machinery) also contributed to the discussion.

Another Unit for Saguenay Company

The Saguenay Light & Power Co. are carrying out the reconstruction of their plant at Ha! Ha! Bay, P. Q., and will install an additional unit. It is proposed to exchange the Chicoutimi Pulp Company's common shares for a like amount, par value, of common shares of the Saguenay Power Company; to increase the number of preferred shares from 25,000 to 30,000, and to reduce the dividend thereon from 7 per cent. to 6 per cent. cumulative from April 1st, 1919; to change the preferred shares into Saguenay Power shares, and to increase the number of directors of the Chicoutimi Pulp Company to nine. The Saguenay Power Company will become the Saguenay Pulp and Power Company, and proposes to acquire the controlling interest in the Chicoutimi Pulp Co., the St. Lawrence Pulp & Lumber Corp., the Chicoutimi Freehold Estates, Ltd., the Roberval-Saguenay Railway Co., the Saguenay Light & Power Co., and the Chicoutimi Port Co.

Water Powers Must Be Developed

Sir Lomer Gouin, in a statement announcing a dissolution of the Quebec Parliament, outlines a policy in regard to the waterways. " These", he says, "must be developed, which means the dotting of this province with manufacturing centres such as Three Rivers, Grand'Mere, Shawinigan, Chicoutimi, Sherbrooke, Drummondville and other centres. Cheap power means more manufacturing and more business, more work, more employment, more money, more labor, more consumption of foodstuffs, more work for the farmer, all of which means better living conditions and general prosperity for all classes of the community. To carry out all this, money must be expended. It may be necessary to borrow, but now is the time for investment."

Itinerary of Royal Naval Exhibition

The Royal Naval Exhibition, comprising a wonderful display of photographs showing the activities of the navy in the war, is being shown at a number of centres throughout the Dominion. In Toronto and Hamilton, where this remarkable set of pictures has been displayed, the keenest interest has been shown. The following dates have been definitely determined: London, May 19 to 26; Windsor, June 2 to 7; Port Arthur, June 23 to 28; Winnipeg, July 7 to 12; Regina, July 21 to 26.

Calgary, Vancouver, Victoria, Edmonton, Saskatoon, Sherbrooke, Quebec, St. John and Halifax will also have an opportunity of seeing this display at dates not yet fixed. The exhibition is under the auspices of the Navy League of Canada.

Mr. Pannell Going to New York

Anticipating the departure in the near future of Mr. E. V. Pannell, of the British Aluminium Company, who is leaving Toronto to open a New York office for his company, the local members of the A. I. E. E. at their last meeting presented him with a travelling bag. Mr. Pannell has very acceptably filled the office of secretary of the A. I. E. E. for the last two years and it is with great regret that his many friends have heard that the expansion of his company's business necessitates his removal across the line.

Steam-Electric Plant of the Dominion Power and Transmission Company, Hamilton

II.--The Turbines and Auxiliary Steam Equipment

The Turbines

Steam at 200 lbs. pressure and 160 deg. superheat is admitted to the turbines, by piping hidden from view in the turbine room. A surface condenser is situated immediately below each turbine. The condensate and air from the condenser is handled by an air and condensate pump coupled on a common shaft, and driven by an impulse turbine.

The turbines are Westinghouse type, multiple expansion, parallel flow design, known as "Impulse Re-action" type. The impulse section consists of two rows of moving and one row of stationary blades; the balance of the machine consists of blading of the re-action type. The impulse blades are of nickel iron and the re-action blades of phosphor bronze. Main bearings are self-aligning. Lubrication is oil pump operated from worm gear on the turbine shaft, with delivery and return piping from and to receiving reservoir and bearings, with sufficient head to insure ample flooding of bearings.

Speed variation at normal conditions can be controlled within 3 per cent. to 4 per cent. if desired. Speed changing device for remote control. Primary admission valves of balanced Poppet type are enclosed in steam chest. The secondary valves are automatically operated by mechanical connection with the governor, and arranged to admit steam to additional stage when load exceeds capacity of turbine when receiving steam through primary valve. The valves will similarly operate should vacuum or steam pressure fall to point where the turbine is unable to normally carry load, and return to seat when excess capacity is no longer required.

A quick-operating throttle valve operates from separate safety governor, to automatically close valve before turbine speed exceeds safe limit. This is capable of adjustment for predetermined speed. Means are provided for tripping by hand in close proximity to turbine.

Operating under conditions of 200 lbs. gauge pressure at throttle, 160 deg. superheat at throttle, 28½ in. vacuum in exhaust pipe referred to atmospheric pressure of 30 in. and at speed of 2,000 r. p. m. the maximum capacity of turbine is 11,000 kilowatts.

Piping, Etc.

The superheater steam lines carry 200 lbs. working pressure, 180 deg. superheat; saturated steam lines, 200 lbs. working pressure. All straight pipe and bends are 2½ in. and larger, of full weight open hearth soft steel; flanging and bending pipes, sizes 2 in. and under, are of same material but extra heavy pipe.

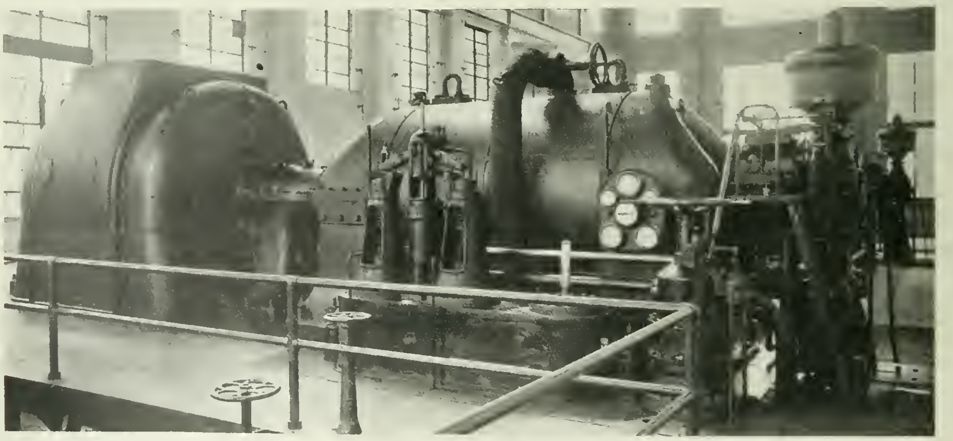
The 2½ in. flanges are extra heavy rolled steel, welded to pipe by the Kellogg forge welding system, in which the flange is first shrunk on the pipe to prevent oxides from forming, then heated in oil furnace to welding temperature and welded with steam hammer, the weld being made solid from face to back of flange.

All outlets on steam lines are extra heavy open hearth forged steel, with flanges welded on by above method. Outlets were welded to mains by Kellogg electric welding process on which filet is built up 2½ times the thickness of the original metal,. weld being hammered during welding to insure close grained metal and then annealed to remove strains caused by high welding temperature. Special 14 in. x 7 in. manifold fittings are made by swedging, a tapered reducer being used at either end, the 7 in. outlets being forge welded to the 14 in. body.

Fittings are of extra heavy cast steel flanged, on sizes 2½ in. or larger; extra heavy cast steel screwed on sizes 2 in. and under.

Valves have cast steel bodies and caps, rolled Monel metal spindles and Monel metal discs and seats. Gate valves are Chapman. Non-return valves are Foster. Small globe valves for throttle valves Jenkins.

Drip and drain pipe is installed from all high and low pressure piping. In high pressure drips, extra heavy cast



Close-up view of one of the 12,500 kv.a. turbo-generator units of Dominion Power and Transmission Co.

steel piping, extra heavy cast iron fittings and extra heavy brass globe valves are used. There are two crane Tilt traps, one for each unit. The low pressure drip and drain piping is made of standard weight material throughout.

Exhaust Steam Lines

Piping is standard lap welded steel througout except 36 in. atmospheric exhaust from atmospheric relief valve, which is 5/16 in. thick lap welded and supplied with copper flashing at roof line. Piping between atmospheric relief valve and condenser of cast iron. Flanges are standard cast iron, screwed and refaced, except 36 in. pipe, where steel flanges and vanstone joints are used. Fittings are standard cast iron flanged. Inlets to 36 in. exhaust risers are of forged steel, welded on. Expansion joints are corrugated copper bellows type.

36 in. atmospheric relief and back pressure valves are Atwood and Norrill standard make. Twin exhaust valves at heaters have their stems geared together with intermediate wheel, so that one valve is open when the other is closed. An 8 in. constant pressure valve with safety closing device, operated from the turbine auto-governor, is connected between excess steam outlet from each feed water heater and main turbine. These valves were made by the Westinghouse Machine Company.

Waste steam from the safety valves is piped to atmospheric exhaust.

Boiler Feed Lines

The piping is extra heavy lap welded steel galvanized. The flanges are the same as for high pressure piping—galvanized. Outlets are welded as for high pressure steam piping. Fittings of heavy cast steel flanged same as for high pressure steam piping. Elbows have long radius where possible. Gate valves are Chapman with hard bronze spindles, discs and seats, steel bodies and caps, outside screw and yoke. There are two 6 in. Crane extra heavy flanged cast steel body swing check valves, one at each feed pump.

Low Pressure Water Lines to Heater and Feed Pump

Piping is standard weight cast iron tested to 300 lbs. high pressure, pipe bends being used in place of elbows where possible, to keep joints down to minimum. Valves are standard weight cast iron, bronze spindles, discs and seats, outside screw and yoke.

Feed Make-up Lines

Piping is standard weight lap welded steel, galvanized. Flanges are standard cast iron, screwed and refaced. Fittings are standard weight cast iron flanged. Valves are standard weight cast iron, bronze spindles, discs and seats, outside screw and yoke.

Blow Off Lines

These connect to sewer. Piping is extra heavy steel, lap welded. Outlets are welded as for high pressure steam. Flanges and fittings—as for high pressure steam.

Condenser Piping

Piping is standard weight cast iron. Valves are Chapman 10 in. and 26 in. list 58½, and 8 in. list 24, solid bronze spindles, seats and discs, outside screw and yoke.

Surface Condensers

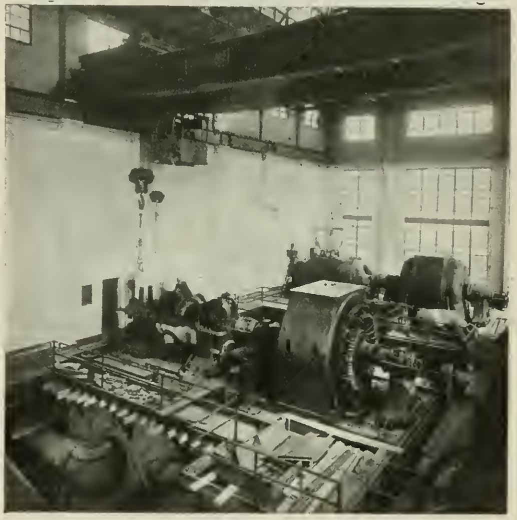
Condensers are two-pass surface type 1, water inlet at bottom and water outlet at top; steam to enter top of condenser. Tube plates are Muntz metal, 1¼ in. thick. 3,040 tubes, 1 in. outside diam, No. 20 gauge (Birmingham) and 18 ft. 10 in. active length of Muntz metal have effective cooling surface(measured on outside of tubes) of 15,000 sq. ft.

13,800 gallons of water per minute will maintain the following vacuum referred to a 30 in. barometer when handling the amount of steam mentioned below:

Temperature of injection water in deg. F. 68;
Condensed steam lbs, per hour, 143,000;
Vacuum, 28.

Pumps

The air pump is of the Westinghouse-Leblanc rotary type with runner of solid bronze, size No. 20 and capacity 12-2/10 cubic ft. per second. The condensate pump is centrifugal type; conditions of operation are: discharge head external to condenser not exceeding 25 ft.; speed, 2,500 r. p. m. The air and condensate pumps are mounted on common shaft and driven by a Westinghouse impulse turbine. These turbine drives are designed to carry full load with 150 lbs. steam pressure, 160 deg. superheat and zero back pressure.



General view of Turbo-generators during erection.

Cooling Water

The cooling water for the condensers is pumped from Burlington Bay by circulating pumps situated below the surface so as to be self-priming.

The circulating pump runners are of closed impeller type. Conditions of operation are as follows: friction head in pipe 2 ft.; level of intake below discharge water, 1 ft.; total pumping head, exclusive of friction head through condenser, 2 ft. The circulating pump is driven by a Westinghouse impulse turbine through Westinghouse reduction gear. This gear is Westinghouse self-aligning type, double helical gears, one right and one left hand, to equalize end thrust. The large gears are carried on solid bearings.

Exhaust steam from the turbines driving the auxiliaries is admitted to Cochrane open type feed water heaters for heating the boiler feed. The feed pumps are each large enough for feeding the boilers under maximum conditions. Figure 3 shows in part air and condensate pump—heater, fan engine and boiler feed pump.

Boiler Feed Pump and Turbine

The turbines are Westinghouse horizontal impulse type with following operating conditions: Pounds steam at throttle, 200 lb. and may drop as low as 150 lb. at times; back pressure 0 lbs. non-condensing; superheat at throttle 160 deg. F.; r. p. m., 2,500. Operating under these conditions the capacity is 125 B. h. p. The admission valve is balanced Poppet type and is operated by mechanical connection with governor. Variation at normal load is 3 per cent. which may be increased if required. The pump is Westinghouse multi-stage centrifugal, horizontal volute type, double suction. The impeller is of bronze.

Operating conditions:—Capacity U. S. gallons per min., 525; number of stages, 3; maximum temperature of water, 210 deg. F.; total head including friction, 520 ft.; r. p. m., 2500; diameter in suction, 8 in.; diameter of discharge, 6 in.; h. p., 125; steam pressure, 200 lb.; vacuum atmospheric exhaust; The approximate weight of pump is 4,100 lb.; weight of prime mover, 1,800 lb.; total weight, 5,900 lb.

General view of turbo-generator room.

Lighting for Production

Mr. W. A. Durgin recently gave an interesting address before the Illuminating Engineering Society, entitled "Lighting for Production." By means of a factory model showing cross section of a typical machine shop and a translucent working plane, the effects of modification of several factors in daylighting were demonstrated in comparison with the results obtained from the usual local lighting systems in practice. The intensity, shadow production, and uniformity of the lighting was considered, the treatment leading up to the superior results obtained from a general lighting system giving productive intensities. The value of this type of installation was shown by the detailed data obtained from four careful tests in industrial plants where the actual production under the high intensity could be compared with that when the old low intensity systems were used. Examples of several recent units in the 300-watt size were exhibited, and emphasis placed on the special adaptation of each to certain classes of installation.

Hamilton Electrical Association

The Hamilton District Electrical Association, which is composed chiefly of electrical contractor-dealers has decided to operate, in future, on the Open Price Plan. Mr. V. K. Stalford, president of the association, has very kindly consented to act temporarily as secretary of this scheme, so that it may be got under way at once.

Storage Heaters for Electric House Heating

By Mr. H. B. Dwight

The fact that house-heating loads of 3,000 kw. and 5,000 kw. have been built up in electric power systems in irrigation districts, where the winter heating load is an off-peak load to the larger irrigation load of the summer, suggests the question whether off-peak energy could not be used economically in other water power systems.

Since in most power systems the peak load occurs daily for two or three hours in the late afternoon, a heating system using only off-peak energy would have to make use of stored heat during those hours. This might be accomplished by utilizing storage heaters connected to a separate supply circuit which could be opened by the substation operators from approximately 3 p.m. to 6 p.m. During that time the storage heaters would automatically open up and deliver their stored heat, so that the lack of the electric power would not be felt. Such a heating load would be an off-peak load provided that it were smaller than the total regular load, which would be the case since electric heating would be used only in the more favorable cases.

If reliable automatic storage heaters were available, factories with a variable motor load could use the off-peak energy of their motor load for heating purposes. This off-peak energy is sold in various localities served by water power at an extremely low rate per kw. hour. A relay could be set to open the heating circuit whenever the motor load increased beyond a certain point, and to close the heating circuit when the motor load fell again. Rooms and buildings could in this way be heated with exact automatic control, without increasing the maximum demand of the electric power load of the factory. A relay could also be used in this way in a substation, so as to give only off-peak energy to the heating circuits.

It might be thought, at first sight, that storage heaters would be undesirable from the householders' point of view, but the opposite ought to be the case, for storage heaters can provide an element of permanence and reliability not obtainable with usual electric heating devices. With an automatic storage heater in every room, designed to maintain the temperature practically constant by stored heat for a three-hour peak period, if power should go off accidentally for three hours the fact would scarcely be noticed. With non-storage electric heaters, however, the room temperature would fall an uncomfortable number of degrees in case of the failure of power for one or two hours. Cases where the failure lasts longer than three hours are very rare with modern systems. The storage heaters would be just as advantageous in cases of breakdown of any part of the apparatus in the house. The trouble could be repaired in two or three hours, and in the meantime the storage heaters could be opened by hand to make their supply of heat available, in case they failed to open automatically.

The difficulty of developing a storage heater which would open up automatically in order to deliver up its stored heat when required, and which would hold the room temperature constant within a very few degrees over a considerable period of time, would not seem to be an insurmountable obstacle.

In the first place, the amount of storage material required is not excessive. Assume that one watt per cubic ft. of the room to be heated will keep the temperature at 70 deg. F. in cold weather. If the room has 2,000 cubic ft. and if the "power-off" period is 3 hours, then 6,000 watt-hours, or 20,500 British thermal units, will be required to be given off by the storage material. The first visible redness in a hot body occurs at 980 deg. F., a regular dull red heat being about 1,290 deg. F. If it is assumed that the storage material cools from 800 deg. F. to 200 deg. F. in the three hours, the fall in temperature will be 700 deg. F. Since the specific heat of concrete is about 0.25, that of water being 1, it is seen that 120 lbs of concrete would be required as storage material. This would mean, for example, two plates 1.5 inches thick, 12 inches high and 40 inches long. If iron were used instead of concrete, the specific heat would be about 0.12. There would be required two iron plates 1 inch by 12 inches by 40 inches. It would be quite economical and appropriate to use much heavier storage plates than these, for the purpose of giving out heat during the peak load period, so that the price for electric energy could be lowered.

In order to indicate a possible method of developing a storage heater. the following arrangement is suggested. Mount two storage plates similar to those described in the preceding paragraph, with the necessary heating elements between them. Enclose the plates in a heat-insulating case, large enough to leave air-space around the plates. The case in turn might be surrounded by a ventilated metal cover. See Fig. 1.

Provide one small door in the top and one in the bottom of the heat insulating case, and arrange these so that their natural position is open, due either to their own weight or to counterweights. These small doors may be held shut by an electric solenoid whenever the voltage is on.

In regular running, an electric thermostat placed at some suitable part of the room will turn the current on or off from the heating elements as required to keep the temperature of the room at the desired figures. The operation of such thermostats is not in doubt, since they have been considerably used in practical operation with electric heating. Heat will escape slowly through the insulating case in sufficient quantity to keep the room warm. The storage plates will become and will remain hot.

When the voltage goes off at the commencement of the peak load period, the solenoid will be de-energized and will allow the two small doors to open. Air will then flow through the doors and past the hot storage plates and so heat will be given to the room even faster at first than when the current was on and the doors in the case were closed. The room temperature may rise slightly, but will fall in time as the plates become cooler. The return of voltage will energize the solenoid and shut the doors, and the heating elements will commence again to deliver heat.

The temperature attained by the storage plates would depend on the weather, and would be in proportion to the work they would be required to do. On very cold days, the electric thermostat would be providing a large amount of current continuously while power was on. The plates would become very hot and when power went off a large amount of heat would be in storage, which would be required, on account of the cold weather. In milder weather, the plates would not attain such a high temperature in steady operation, and the stored heat would be less. This would lessen the tendency of the storage plates to overheat the room in mild weather when the power was off.

In spite of the above consideration, however, it is probable that further refinements would be necessary in order to keep the room temperature constant within a few degrees for two or three hours. Additional larger doors could be provided in the insulating case, resting by overlapping edges against the small doors previously described, and held shut by latches. When the small doors were shut by the solenoid, the larger ones would be carried shut and latched shut. Then, when power was off, if the small doors were not sufficient to keep the room warm, a special thermostat would trip the latches of the larger doors, thus sending heat into the room at an increased rate.

It would be possible to use latches on the smaller doors, so that the solenoid would be required to operate only momentarily. The solenoid would therefore be of smaller size, and would not give out any hum during regular operation, since it would be energized only at the moment of closing the doors. It would also be possible to arrange the control so that if the room had become cool while voltage was off, the doors would not close and the heating elements would supply heat direct to the room until the temperature rose to the standard value.

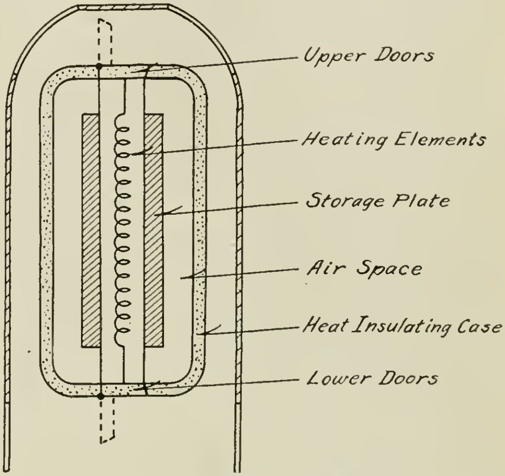


Fig. 1—Section of Storage Heater

If such a heater were installed in every room of a house, the temperature of each room would be constant irrespective of wind or weather. This would seem to be an ideal arrangement from every point of view. It would overcome the most common defect of all heating systems, namely that when the wind changes its direction, certain rooms become difficult to heat. This arrangement would also eliminate the discomfort and the cost due to overheating. No attention whatever would be required, except in cases of unusual conditions or of failure of the apparatus. In such cases the electric circuits and the doors in the heat insulating case could be opened and closed by hand.

For instance, for sleeping apartments the power circuit could be opened at night and the doors in the heater case could be fastened shut. The stored heat would therefore come out very slowly indeed, which would be a desirable feature. In the morning the doors in the case could be fastened open and the power turned on to give direct heating. For living rooms, it is probable that no adjustments would be made at any time, as a constant temperature would be the most desirable condition.

It is evident that a storage heater should be very substantially and reliably constructed. It should be designed so as to withstand continuously the highest voltage given by the circuit, without fire hazard, even if the thermostat failed to cut off the current.

It may be noted that off-peak energy has the lowest cost with water-power systems which do not have water storage. Off-peak energy has a higher cost with steam stations, and so where steam power is used, electric heating is not likely to be economical. However, in the more favorable districts this application of electric energy may be worth developing.

A New Type of Electric Furnace

By Axel Sahlin*

The electric furnaces hitherto constructed may be divided into three different groups, viz.

(a) Induction furnaces;
(b) Furnaces with a free-burning arc; and
(c) Furnaces relying on a direct arc between the metal and the bath.

The first-mentioned type of furnace is now only occasionally found.

The free-burning arc furnaces have found favour, especially for work where it is desirable to avoid any chemical reaction between the carbon in the electrodes and the bath. They have a decided advantage in giving the means of heating the cold furnaces without the introduction of any charge and by the arc only.

On the other hand, they have the disadvantage that, as soon as the bath is formed, the heat is transmitted to the surface only and no circulation is set up in the molten metal.

Many furnaces of this type have suffered from defective mechanical construction. On that ground some users have preferred direct arc furnaces, in spite of the disadvantages of heavy and cumbersome electrodes, furnace roofs pierced by large holes, and the necessity of using a source of heat other than the electric current to bring the furnace up to melting temperature.

The furnace which is the subject of this paper has been designed with a view to embodying the advantages of both the direct direct arc and the free-burning arc furnaces, at the same time avoiding as far as possible the disadvantages of both.

Description

The furnace is built as a circular ladle with contracted top and dished bottom. The shell is made of heavy steel plates, riveted together with $\frac{7}{8}$-inch rivets closely spaced. The plates are perforated by $\frac{3}{8}$-inch drilled holes, spaced about 12 inches apart and serving as vents for moisture contained in the lining. The top rim is reinforced by a heavy flat hoop riveted to the shell plates. The steel casting trunnions are riveted to the shell and rest in bearings set so as to allow for expansion and alignment. To the overhanging end of one trunnion is keyed a crank which, by means of an enclosed screw, running in oil, working in a swivelled crosshead and turned by handwheel (or, for larger furnaces, by motor) serves to tilt the furnace to any desired angle.

The bottom of the furnace is made up of a layer of coke dust and tar rammed in, supporting double layers of brick. On top of this is rammed and fixed in successive layers a hearth consisting of burnt dolomite and tar for basic operation, or of ganister in case the acid process is adopted. Supported and resting on the firebrick, outside the hearth, is placed a circular lining backed by a heavy insulating layer of asbestos sheet and formed of circle-bricks laid with ground joints and thin mortar. This lining may be made of magnesite brick for basic process, or of silicia brick for acid process. In the lining are placed on the same vertical lines two holes for each pair of electrodes, and one door opening which serves both to charge the furnace and to pour the steel. For larger furnaces one tapping hole and two charging doors would be a better arrangement.

On top of the contracted top of the side lining rests the dome-shaped roof built of basic or acid brick fitted in a circular steel frame, forming a rigid skewback. The roof joint is made of a layer of powdered dolomite or ganister spread on top of the side wall. The roof can be removed by crane without delay, and replaced by another preheated roof held in readiness to take its place. As it is found that the portion of the roof opposite to the arcs is affected more readily than the portions nearest to the electrodes (which is protected to a certain extent by the shadow of the latter) the roof can be turned round to any angle desired. Thus, when the weakest portion is getting thin, the life of the roof can be prolonged by exposing to the fiercest heat the section of the roof hitherto more protected.

It is also possible to charge the furnace through the top by removing the roof while the charge is put in place.

Electrodes

The electrodes are graphite or carbon electrodes, of cylindrical form, extended as they are burnt away by screwing a new section of electrode to the rear end of the electrode in operation. The joint is made by threaded dowels of graphite. The electrodes slide through water-cooled electrode holders made of steel pipes welded to rings at the front and back ends. Nozzles for water supply and discharge are tapped into these rings, and are connected with rubber hose to the water mains. The electrodes are wrapped in sheets of asbestos, mica, or fibre, and are thus insulated from the furnace body.

The electrode cooler with its insulation is placed between the fixed upper and sliding lower jaws of a clamp which is pivoted to a frame bolted to the furnace shell. A wedge placed beneath the lower jaw of the clamp causes it to grip and firmly hold the insulated cooler with the electrode sliding through the same.

The top part of the clamp is extended outward forming a support and U-shaped guide for the slide which grips the rear portion of the electrode. In the hollow interior of the U-shaped guide works a screw which engages against a nut held in place by prongs extending from the electrode holder. If the screw is turned, the electrode holder is moved toward or away from the furnace, advancing or retiring the electrode. The upper portion of the electrode holder is insulated from the grip by a sheet of fibre. The lower swivelling portion of the grip is closed and tightened by an eye bolt with hand-wheel nut. Both halves of the grips are water-cooled, and are fed through nipples connected to the water mains by rubber hose. Both grips are made with an extending wing, to which is bolted the bronze cable socket which receives the end of the cables, transmitting the current from the switchboard to the electrode. Both the swivelled guides are adjusted in a vertical sense, controlling at will the inclination of the electrodes.

Electric Arrangement and Wiring

The number of electrodes proposed is as follows:—

For a furnace hearth
up to 3 ft. 6 in. diameter, 1 pair
from 3 ft. 6 in. to 5 ft. diameter, 2 pairs
from 5 ft. to 7 ft. diameter, 3 pairs
from 7 ft. to 9 ft. diameter, 4 pairs
from 9 ft. to 11 ft. diameter, 6 pairs.

This number can be modified according to circumstances.

The electrodes should be preferably of graphite, varying from 2 inches up to 6 inches diameter, according to the size of furnace and the amount of current. Each pair of electrodes enters the furnace in the same vertical plane, but at different and adjustable angles.

The upper electrodes are supplied with current. The lower electrodes, as well as the furnace body, (and, if the furnace is going to be used largely for refining work, a bottom electrode bedded in the hearth) are connected with the common of the transformer, or earthed.

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*Before the I.E.E.

For a one-pair furnace, direct current or one-phase alternating current is used.

For a two-pair furnace it is preferable to employ two-phase current, generally obtained by three-phase transformers arranged in Scotts coupling.

For a three-pair furnace, three-phase current is used, one phase being coupled to each upper electrode.

For furnaces with more than three pairs of electrodes, groups of two pairs are coupled in parallel; therefore, a four-pair electrode furnace uses two-phase current, whereas a six-pair furnace should be supplied with three-phase current. If for any reason it may be found desirable, the upper electrodes can be earthed, and the current can be supplied through the lower electrodes. A bottom electrode bedded in the hearth may be used or not. It is useful when refining because, as the lining material gets very hot, it becomes a good conductor and passes the current through the bath into the bottom electrode when using the direct arc.

The pressure of the supply should preferably be transformed to 100 volts which, by plugs on the transformer, may be reduced at option to 80 or 70 volts.

The connections for a two-pair furnace are shown in Fig. 1. To avoid any chance of shock to operators, it is advisable to place a wooden operating platform over the floor at the back of the furnace around the electrodes. All the electrodes are distributed around the half of the circumference of the furnace opposite to the tapping hole and charging doors. For the smaller sizes of furnace the electrodes are fed forward by hand-wheels.

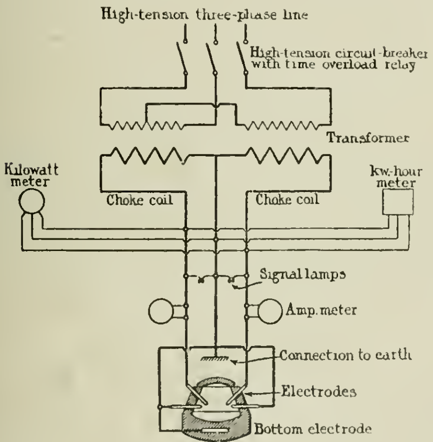

Fig. 1.—Diagram of wiring of a two-pair Sahlin furnace.

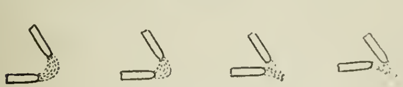

Fig. 2.—Direct arcs observed with different positions of electrodes.

The current taken is observed by reading kilowatt meters placed on a switchboard suitably located, and receiving the feeders from the transformers. It seems to me an advantage to provide choke coils to steady the current.

Assuming that the furnace is to be used for melting and refining steel, the first operation is the heating of the furnace to the proper temperature. This is effected by turning on current and gradually advancing the points of the convergent electrodes of each pair until an arc is formed. Experiments have proved that as long as the points of the electrodes are at a certain distance from each other an arc is formed between the two electrodes. As the electrodes approach each other this arc bends outward, forming a loop. If the distance is still further reduced, the loop breaks and the arc rushes forward, sweeping downward toward the surface of the metal like a broom. If the top electrode is advanced downward (see Fig. 2). The form and direction of the arc can easily be modified by altering the angles of the electrodes and ther relative position to each other. The free-burning arc heats the furnace while empty.

The second operation would be the charging. When the furnace is heated, current is taken off, and the electrodes are drawn toward the back wall of the furnace to prevent their being injured, while the material to be melted is thrown or pushed into the furnace through the charging door, or eventually through the furnace top, the roof having been removed. As soon as the charge has been placed in the furnace, the electrodes are advanced. Experience has shown that numerous momentary arcs are formed between the upper electrodes and the charge, but as this latter is melted away in the vicinity of the electrodes, the regular free-burning "broom" arc is formed between the two electrodes and the working of the furnace settles down to normal. The radiation and reflection caused by the free-burning arc are most effective for rapid melting. As, however, the bath is formed, this kind of arc reaches only the slag-covered surface of the metal, causing but little circulation in the interior of the bath. At this point, therefore, in the free-burning arcs are broken by the retirement of the lower electrodes and a direct arc is formed by the advancing of the upper inclined electrodes toward the surface of the slag. If the bottom electrode is employed, the current will penetrate toward this bottom electrode which is earthed. The furnace is now working on the lines of a Girod furnace, and creates an electric arc which causes a rapid circulation in the bath and direct transfer of heat to the metal.

In furnaces with more than one pair of electrodes, it is possible to have some of the electrodes produce a direct, and some a free-burning arc, thus making use of the effective radiating and reflecting action of the free-burning arc, at the same time as the bath is agitated by the direct arcs.

Special Work

For use as a heating furnace for very high temperatures such as are required for the production of graphite, for the calcining of magnesite, for the crystalizing of bauxite, for special crucible work, and for other similar objects, it is proposed to suspend the furnace shell containing the side walls and roof with the electrodes and the electrode mechanism from four lifting rods, operated by electric motor, hydraulic cylinder, or windlass. The bottom of the furnace which for this work does not require any bottom electrode, would be placed on a truck. On this portable bottom would be placed, in proper arrangement, the material to be heated. The loaded truck being placed beneath the furnace body, this would be lowered on to the truck enclosing the pile of material. A free-burning arc would now be started between the electrodes in each pair, and the furnace would be brought up to the required temperature. The material having been thoroughly heated or calcined, the furnace body would be lifted from the truck, which would be run away to give place to a second truck loaded with fresh material. The loaded trucks could be preheated in a gas-fired furnace before the bottom was placed under the electric furnace. This procedure has been described only as an indication of a use for the electric furnace, filling a long-felt want, but the actual arrangement of the plant would, no doubt, be different for each case and should be separately studied.

Advantages

It will be found that the furnace, as above described, is of a very strong construction—rigid, simple, and durable. All the surfaces of the brick linings are convex, and the walls will, therefore, be held in position. The surface of the melting room, confined by spherical and cylindrical walls, is the smallest possible for the largest volume, and the amount of brickwork in the furnace is therefore reduced to a minimum. The electrodes are easily secured in place, adjusted, advanced or retracted by means of hand-wheels. There are no bolts or nuts manipulated by wrenches used in the adjustment of the furnace, every operation being carried out by hand-wheels or cotters. The roof is solid, without any openings, removable and exchangeable in a minimum space of time. The furnace can be run either with free-burning arcs, with direct arcs, or with free-burning and direct arcs working simultaneously side by side. Changes are made without cutting off the current.

When the furnace is employed as a free-burning arc furnace no chemical reaction between carbon of the electrodes and the bath takes place. The overhanging length of the electrodes is comparatively short, and the arcs are formed fairly close to the circular furnace walls, being directed inward and downward toward the centre of the furnace.

The Sahlin furnace has not yet been placed on the market owing to the difficulty of obtaining a permit for its construction during the war, but a furnace is now being built in Great Britain intended for the production of steel ingots and castings.

The Problem of the Electric Railways

By L. A. Herdt, D. Sc.*

Electric railway transportation stands face to face today with the greatest crisis in its history. This crisis is not due to some new competitor bidding for the first place as a common carrier; the electric railway is, and will be for some time the most economical urban and suburban carrier; jitneys, busses and others will not succeed against it. The crisis is a financial one and the problem of today concerns the method of saving an industry whose entire economic basis has been undermined.

In 1918, 4,900 miles of electric railways, more than 1/10th of the total mileage in the United States, went into receivership, representing a value of more than $500,000,000, and 750 miles of electric railways abandoned their service, representing a value of $80,000,000.

A great many electric railway properties have grown weary from hope long deferred and are considering dismantlement at present day scrap prices rather than prolonged existence as losing ventures.

Brooklyn Rapid Transit with 755 miles of track and a funded debt of $120,000,000 and 75½ millions of outstanding stock is in the hands of a receiver. A fare of 8 cents is in effect today and has so far proven insufficient to pay the cost of service. The Pittsburg Railway operating 605 miles of track is in the hands of a receiver. Hundreds of others could be cited. Roads which before the war were considered the strongest financially in the country cannot any longer withstand the economic conditions which face them.

Face to Face With Bankruptcy

The suggestion is sometimes made to the effect that the companies should carry on their own burdens by borrowing money, if the street car operations are now unprofitable. Let anyone go out and attempt to borrow money on an afflicted company's credit. Credit only comes from prosperity.

The whole structure of the franchise relationship between the electric railway and the various communities has broken under the strain of war. The rapid increase in the cost of everything which is used in operating street railways, the extraordinary demands of labor for high wages, made necessary by the rise in the cost of living, the alarming decrease in the purchasing power of the dollar, has brought the electric railways face to face with bankruptcy. The fundamental fact exists that under the present costs of material and labor, the majority of the street and interurban railways are furnishing, in response to the demand of the public, a service which costs more than they collect in fares.

Electric railway fares or rates are in the majority of cases regulated by law, or are established by existing franchises. With fixed fares, fixed 25 or 30 years ago, no avenue of automatic escape from rising costs lays open to the electric railway industry. In fact, the electric railways have staggered for years under inadequate rates, so that in the majority of cases, their credit has been destroyed, service impaired, equipment deteriorated to the brink of destruction.

The electric railways, (not in Montreal alone) but everywhere, are asking for higher fares. These appeals have been met by a storm of rebuke. The public seems to be willing to permit this great industry to stagger on under the burdens thrown upon it with inadequate relief in the way of increased rates, while exposed to the full brunt of the extraordinary increases in cost of labor and material. The public must be brought to realize that its interest in the electric railways of the country is greater than that of the stockholders or bond holders. The electric railways must be placed in a position to continue to discharge their essential service.

Condemned Without a Hearing

The public condemns the street car company without a hearing. Why? What is this due to? I believe that the unfairness of the public is due to the public's blissful ignorance. The public knows nothing about the street car company's troubles because the street car company does not make a confidant of the public. Public utilities, like some other big interests, rush into print only when some calamity is about to befall them. They make some sort of plea. The public which is the plaintiff stands by its guns. It doesn't realize the good that the defendant has done because it has heard only the bad. The public, someone has said, is the fairest being on earth, but it must be talked to, it must be told the facts.

A community with adequate and efficient street car service is busy, growing and prosperous, while the city, large or small, which has inadequate local transportation is dull, dead or dying. Efficient local transportation, adequate to the needs and welfare of the community is imperative.

The public utility, tied by contract and franchise, with heavy financial obligations, and with definite essential responsibilities, must work constantly and continuously to fulfil its obligations—it is tied down hand and foot over long periods of time, and is held down at best to small financial re turns, yet the public calls the company impertinent and worse, if it asks for a nominal increase for its products. Food has increased 100 per cent; shelter 20 per cent; clothing 90 per cent—it is paid. But a public utility asks 20 per cent—this is impertinence carried to its limit.

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*Vice-chairman Montreal Tramways Commission, Montreal.

Fares Sufficient to Operate the Road

It is planly evident that whether the public shall decide to operate the street railways, whether it assumes greater control over them, or whether it allows them to remain in the hands of private investors, the unit of their fares, the price at which their product is sold, must be sufficient to operate the roads. The fares should be restored to the level which prevailed in past years. The ticket dropped in our fare boxes today bears an impress "5 cents," but as compared with the 5 cents of a few years ago, it is 2½ cents and no more. The street railway franchise, or the statute or agreement calling for the 5 cents unit called not for an impress or a coin, but for a certain value of purchasing power. The equivalent of the 5 cents coin in the decade 1890 to 1900 purchasing power is the 10-cent fare. The purchasing power of the dollar has declined at least 50 per cent. since the early nineties. In other words, the 50 cents of that period bought what it requires $1.00 for today.

The decreasing purchasing power of the dollar is not a product of the war alone. The war but gave it an additional, although a mighty, impetus. The various little things that we used to pay 5 cents for are now up with an advance of 2 to 4 cents—4-cent articles are now 6 cents, and 2-cent little things are now 4 cents. If we get right down to the cent, the newspaper that used to sell for one cent is now selling for two, an increase of 100 per cent. This is all fair and just, it appears, but street car fares must remain where they are—any increase will not be tolerated.

Falling Off in Net Income

Does the public pay high prices for electric transportation service? No—decidedly no. A tabulation of the income accounts of 388 electric railways, representing more than 63 per cent of the electric railway mileage of the United States and Canada, shows a falling off in net income of 82 per cent in 1918 as compared with the corresponding period of 1917. Many companies are facing actual operating deficits in spite of increased fares and increases in gross receipts.

In any other business the manager provides for increased costs by advancing his selling price. The electric railway company with fixed fares cannot do this; only when on the brink of destruction will the community admit that there is a justification for the readjustment of rates, and even then the increased fares have in a majority of cases caused a falling off in traffic and resulted in little, if any, actual increase in gross revenue.

Is there a remedy for the conditions facing public utilities today? Let us see how the cost of street railway service is made up. Cost of electric transportation service is made up of three main items:—

1st—Cost of operation, including platform wages (motormen and conductors), power for the cars, heating and lighting and taxes.

2nd.—Maintenance and renewals of the system as a whole.

3rd.—Fixed charges, i.e., interest on the moneys invested in the system, including city rental for use of streets.

In the city of Montreal, for the period from July 1st to December 1st in the year 1918, the operating expenses per revenue passenger were in round figures 2.6 cents, or 58 per cent. of the revenue. For maintenance and renewals. 75 cents or ¾ cents per revenue passenger was spent, that is 3.35 cents or 75 per cent. of the revenue was disbursed for operating expenses, maintenance and renewals. For this same period the average return per revenue passenger was 4.45 cents. Of the remaining 1.1 cents average return per revenue passenger, 1 cent in round figures is required to meet the financial obligations of the company; that is, to meet the interest on the bonds and debentures, leaving 0.1 cents or a little over one-tenth of a cent per revenue passenger to meet the city rental and shareholders' dividend. In other words, in the last six months of 1918, 75 per cent. of the fare collected was paid out by the company for operating, maintenance and taxes; of the remaining 25 per cent., 23 per cent. went to interest on bonds, mortgages and debentures; the remaining 2 per cent. goes to the city, the balance, if any, to the shareholders.

10 Per Cent. Increase in Wages Would Wipe Out Dividends

Of the total revenue in 1918, not less than 38 per cent. went to labor and 37 per cent. to material. In the year 1918, over $3,000,000 was paid in wages; less than 1/10th of this was paid to shareholders. An increase of 10 per cent. in wages would therefore wipe out all dividend payments for one year.

The Montreal Tramways in the year ending June 30th, 1914, just prior to the war, spent in operating expenses including maintenance and renewals 58.89 per cent. of its revenue. In 1918, as stated above, the operating expenses including maintenance and renewals amounted to 75 per cent. of the revenue. It may also be stated that the expenditure for maintenance and renewals was below the average spent in previous years.

Increased wages and increased cost of materials are responsible for this large increase in operating cost. Municipal ownership is urged by many as a panacea. One year of municipal ownership of railways in the United States has proved the absolute danger of such control. It should be borne in mind that whether the public operate the street railways under public ownership, or whether they are operated by officials—the servants of private investors—the unit of the fares, that is, the price at which the product is sold (in this case transportation) must be such as will be sufficient to meet the total operating costs.

The management of an electric railway is not as blind as to refuse an extension of facilities or an improved service if it is likely to bring an increase in revenues, but it costs money to run cars and certain revenues must be obtained to keep the cars running.

The real cost of service per passenger depends on the length of time that he occupies space on a car and hence the traffic conditions of high cost are:

(1) slow average speed

(2) long average ride.

Real Cost of Service

If we divide the company's passenger revenue per annum by the number of revenue passengers per annum we obtain the average return per revenue passenger. With fixed fares, this return per revenue passenger is constant. In Montreal, the return per revenue passenger before the increase of fares was on an average 4.1 cents; it is now 4.8 cents, an increase slightly less than ¾ cents per passenger or an increase of 18 per cent. over the previous rate of fares For every revenue passenger carried the company now receives 4.8 cents, irrespective of the distance travelled by the passenger. The dweller in Notre-Dame de Grace or Ahuntsic, or Cartierville who rides 5, 6 or 10 miles, pays no more than the dweller in Hochelaga or St. George or St. Denis Wards, who rides only half a mile to destination.

I have previously stated that the real cost of service to a passenger depends on the length of time that he occupies a space on a car, and hence the traffic conditions of high cost of service are:

(1) slow speed;

(2) long average ride;

The largest single item of expenditure is labor as it absorbs from 38 per cent. to 40 per cent. of the total revenue.

Speed is Important Factor

The labor charge amounts to a fixed quantity per hour that a car is in operation, that is, the labor charge is not proportionate to the distance travelled by the car, that is, to the mileage, but the higher the average speed of the car, the lower will be the labor cost for a given distance travelled by the car. Economy demands the largest possible car mileage in proportion to car hours and this makes the speed at which cars are operated very important. Every effort must be made to increase the average speed. Not only does a high speed make the service attractive but it also makes possible lower prices. It is the speed and cheapness of operation which makes five cents rapid transit in subways and elevated roads possible.

The previous discussion has pointed out that to provide proper service the earnings per passenger must be sufficient to allow a liberal allowance for operating expenses per passenger, that is, an adequate car mileage per annum varying with the total number of passengers must be provided. Funds must also be provided for the proper maintenance and repair of the tracks and equipment. Annual fixed charges of the capital invested in the system must also be paid.

Under the new contract, the Montreal Tramways System is operated under a service at cost plan whereby the fare is automatically adjusted to meet the cost of service, including in this cost a fair return to capital invested in the enterprise.

Control of Fares to Prevent Exploitation

The new Tramways contract embodies primarily the control of the fares, that is, the control of the fares in order to prevent unreasonable profits to the company from exploitation of the need of the public for tramways service. The **cost of service principle** is embodied in this contract.

The principle of controlling the fare in order to prevent such exploitation, or in other words, imposing a limit to the profits of the company, involves in equity the provision also of means to guarantee to the company a minimum fair return on its investment. As the chances of excessive profits are removed, so the chances of loss must be minimized. It is clear, therefore, that at any time the fare must be sufficient on the average to pay for the cost of operation and proper maintenance of the system with such other legitimate charges against revenue as may be agreed on, including a fair minimum profit on the invested capital of the company.

This return is a preferred charge on the revenue of the company after paying for the operation and proper maintenance of the system. If a guaranteed return is provided, the company must allow of a measure of outside control on such deductions from revenue as have priority over this return on the capital invested. It follows, that the various items of the cost of service must be externally controlled.

In order to provide for proper service to the public, the contract provides continuous control of the car service. This necessitates the provision of sufficient cars to carry the traffic under average conditions and special provision for rush hour conditions. It is impossible to formulate clauses in a contract to provide for control of this nature; a controlling body must be empowered to order such changes as from time to time may become desirable after careful study of the traffic requirements. Apart from rush hour conditions the service bears a simple relation to the average number of passengers per car mile, carried per annum, that is, the density factor. The cost of operation and maintenance per passenger varies almost inversely as this density factor. Thus a high value of this factor results in a low cost per passenger, but the cars will be crowded. At the present time, when the base costs of operation and maintenance are high, it is necessary to allow a high value for this ratio in order to keep the cost per passenger within reasonable bounds. This limit is imposed by the average fare per passenger collected. With a decrease in base costs it may be desirable to reduce this factor, giving improved service at the same maximum cost and fare.

Tolls Reduction Fund

After all the charges have been paid, viz: operating expenses, maintenance and renewals, fixed charges, city rentals, the remaining surplus is to be divided in the proportion of 20 per cent. to the company, 30 per cent. to the city and 50 per cent. to a special fund devoted to the reduction of fares. The sum total of this fund is used as the indicator of the adequacy of the fare charged to meet the charges of the company. If this fund becomes depleted due to drafts to make up shortage in the contingent reserve fund, it will be evident that the succeeding year's operation would show a further drain of reserve which would not be replenished from the Tolls Reduction Fund. All the charges against income would not be fully guaranteed for the succeeding year and since such guarantee is a primary condition of the contract, it will be necessary to revise the fare schedules to replenish the contingent reserve fnud. At any time, when owing to there being a large balance to the credit of the Tolls Reduction Fund, the same being sufficient to make up the estimated decrease in gross earnings at a lower fare for a period of several years, it is provided that the controlling body may order a reduction of fare.

This method of obtaining a readjustment of fares, being based on the total of a fund to which, when any surplus exists, money is added each year, prevents the possibility of postponing a reduction of fare by excessive expenditure undertaken to reduce the annual surplus. In this respect the scheme of the proposed contract is different from any that have been in use.

It will be seen from the above discussion that the permanent controlling body is necessary. It is obvious that outside control, as above provided for, is in the interest of the travelling public.

City Partner is Enterprise

Since the city shares in the profits and responsibilities of the tramways system, it is a partner in the enterprise. It is desirable, therefore, that such controlling body should be independent of the city of Montreal and of the Tramways Company, and should be an entirely independent body. In this way the best interest of the property and of the public will be served.

The agreement provides for a proper return on the fair value of the property and guarantees efficient service to the community.

On such a basis the matter of fares readily adjusts itself and such questions as the extension of service into unproductive territory, increase of service and other questions that have caused irritation in the past will present themselves for consideration in an entirely new aspect. All unnecessary burdens and all additional burdens imposed upon the electric railways must inevitably and logically be reflected sooner or later either in the rate of fare or in the impairment of the service rendered. The familiar protests against the crowding of cars, antiquated equipment, infrequent service, poor service, transfer privileges, etc., will now come back to the car riders themselves and the remedy is obvious.

The people of Montreal or any other city can ride in discomfort or in luxury according to the bill which they are willing to pay.

Westinghouse Company Establishes Memorial Scholarships

As a memorial to the more than 8,000 employees of the Westinghouse Electric & Manufacturing Company who entered the service of the Government in the war, this company has decided to establish a number of technical scholarships. The details of the plan by which this will be done have been given out by President E. M. Herr as follows:

"Four War Memorial Scholarships will be established each year under the following general conditions—

(a) Candidates will be limited to sons of employees of the Westinghouse Electric & Mfg. Company and its subsidiaries, who shall have been employees in good standing for a period of five years.

(b) Two of such annual scholarships may be open to the younger employees of the company or its subsidiaries who have been in their service for a period of at least two years and who do not exceed the age of twenty-three.

(c) The selection is to be determined by competitive examination to be conducted annually by the company's Educational Department under the direction of the committee hereinafter provided. The examination is to take into account not only the applicant's academic training and preparedness, but due consideration will be given to personal qualifications, general character and aptitude.

(d) Scholarships will entitle the successful candidate to pursue a four years' course in any technical school or college that he may select with the approval of the committee. The scholar may pursue a course in any branch of engineering that he may select.

(e) Scholarships will be granted for one year only but will be continued for the full four years provided the scholar maintains the academic and other standards required by the college or institution in which he elects his course of study.

(f) Each scholarship carries with it an annual payment of $500.00 to be made in two instalments.

(g) The company will establish a Memorial Scholarship Committee consisting of three vice-presidents of the company to whom shall be referred the names and records of the candidates and who will select therefrom the four successful persons, who, in its judgment, have most satisfactorily met the tests applied. The said committee will also be charged with the duty of establishing the detailed rules and regulations and such other matters of administration as have to do with this particular matter.

It is the intention of the company to continue these Memorial Scholarships from year to year but the company reserves the right to recognize changing conditions and to modify the plan or discontinue it entirely if, in its judgment, its seems wise and expedient to do so."

Montreal Tramways' Wages

The employees of the Montreal Tramways Company have been awarded a second advance in wages by a board of arbitration, which has been accepted by the men. The award will go into effect on July 1st. Under it motormen and conductors secure advances of from six to eleven cents an hour, according to length of service, while the shop workers obtain a flat increase of twelve cents an hour. All other men paid by the hour will receive an increase of 7c an hour, while those paid by the month, such as clerks, inspectors, etc., will in the case of those receiving less than $100 per month, obtain 25 per cent. more, and those receiving more than $100 will obtain a 20 per cent. increase. The demand for time and a half for Sundays and holidays was not granted.

Some Pertinent Questions

1. Should the citizens at large be compelled to make good annually, through the tax rate, the deficit created by the operation of city-owned utilities?
2. What percentage of the passengers carried on the civic car lines reside outside the city limits?
3. Why should the citizens of Toronto furnish transportation at a loss to these people who are not even taxpayers?
4. If the basis of Municipal Ownership is service at cost, why not charge the cost of service to those who receive same?
5. Should not the civic car lines be put on a better revenue-producing basis so that our civic officials may have a fair chance to demonstrate their ability to handle civic transportation?
6. Does not the annual deficit from the operation of the civic car lines provide one of the most potent and damaging arguments urged against municipal ownership? Is not this argument being used today?
7. If the city were to charge the present rate of fares on the proposed North Yonge Street and Mount Pleasant lines, by what amount would the annual deficit be increased?
8. Are the real advantages to the community of encouraging people to live outside the area served by the Toronto Street Railway of importance enough at this critical time to counterbalance the dangers of operation by deficit (to be made up from general taxation)?
9. Do the citizens wish the present policy of fares below cost continued?—Bureau of Municipal Research.

Personal

Mr. L. C. Haskell, of the Southern Canada Power Co., Montreal, has been elected a member of the executive of the Purchasing Agents' Association of Montreal and district.

Louis A. Kinnear, B.Sc., of the engineering staff of the Hydro-electric Power Commission of Ontario, lost his life by drowning on May 12 in Lake Jessie, near Nipigon.

Mr. E. J. Gilmour has been appointed assistant district manager of the Winnipeg territory for the Northern Electric Company, Limited. He was formerly district manager, Montreal office.

Mr. Julian C. Smith, vice-president of the Shawinigan Water & Power Co., has been elected a member of the committee of the Montreal branch of the Canadian Manufacturers' Association.

Mr. A. Stuart Pratt, of Stone and Webster, Boston, has been appointed president of the Nova Scotia Tramways & Power Company. The company have extensions and improvements under consideration.

Mr. W. Herbert Tees, formerly superintendent of the Sayer Electric Co., and electrical engineer of the Canadian Consolidated Rubber system, Montreal, has joined the sales department of the Willys-Overland Co.

Mr. F. J. Spielman, of Spielman Agencies, Reg'd., Montreal, has been elected vice-president of the Association of British Manufacturers. The Montreal branch has 51 members and the Toronto branch 40.

Mr. James Gunn, general superintendent of the Toronto Street Railway, recently passed the fiftieth anniversary of his service with the company. He was appointed secretary to the company in 1869, when the road consisted of only a few horse cars on Queen and Yonge Streets.

A deputation of the Liverpool City Council and engineers will visit Canada and the U. S. to study electric railways, lighting equipment, and electric installations. They will visit Toronto and Montreal.

The Contractor-Dealer

Electrical Contractors and Dealers of Montreal Form Association to Deal With Wages and Other Pressing Problems

The Montreal branch of the International Brotherhood of Electrical Workers have made a demand for increased wages. They have sent to the local contractors a form of agreement setting out the new scale and conditions. These provide for an eight hour day, between 8 a.m. and 5 p.m., excepting Saturdays, which is 8 to 12. A wireman is defined as one who has worked for 4 years at the business, and has passed a satisfactory examination and holds a wireman's card. An apprentice is one who has been in the business not less than three years, and who is over 16 years of age; no apprentice is to be allowed to work on a job unless under the direct supervision of a journeyman.

A firm shall be allowed one helper to every journeyman and one apprentice to every five journeymen, and he shall serve at least four years. Men sent from Montreal to work at outside points shall have their fares and board paid which shall not be less than $10 per week, with reasonable expenses for travel. Travelling time to and from such work shall be at the prevailing rate of wages; should a man work day shift and be requested to travel at night he shall receive one day's pay, and 8 hours shall constitute a day's work. If travelling at night, a sleeper shall be provided. In the event of a sleeper not being provided he shall receive overtime wages for the time travelling.

Contractors shall furnish the necessary tools for conduit work and supply all drills, unusual types of drills, bits, hacksaw blades, rubber gloves, and all wrenches over 14 in., balance of tools to be provided by journeymen.

The schedule of pay is: charge hands 85c. an hour; journeymen, 75c.; armature winders, 75c.; helpers, 50c. Sundays and legal holidays shall be paid double time; all time after 5 p.m. until 8 p.m. at the rate of time and a half, and Saturday afternoons time and a half.

All differences arising between the parties to the agreement are to be settled by an arbitration board consisting of two contractors who have signed the agreement, and two members of the Montreal branch of the Brotherhood, the four selecting a fifth member.

On May 22nd the principal electrical contractors met to consider the demands of the men and also to discuss the question of organization. The whole position was gone over, and it was decided to form an Electrical Contractors' Association. A committee composed of Messrs. J. F. Parsons, F. Thomson, St. Amour, H. Vincent, and Henry was appointed to discuss the subject of a permanent organization, outlying the general basis of such a society, and also to consider the demands of the men and to suggest a form of agreement with the employees. This committee will report to a further meeting when it is proposed to form a permanent organization.

All the speakers endorsed the idea of an electrical contractors' association to deal with labor and other problems.

It was felt that it was only by co-operation could such problems be satisfactorily dealt with, and Mr. Parsons, who presided, pointed out that the electrical contractors of the city would only be following the lead of others engaged either as employers or employed in uniting into an association. At the same time, it was urged that it was not sufficient to form an association—the real test of unity was to stick to it and to one another, after the association had become a reality.

The meeting was quite enthusiastic, and representatives of the largest firms in Montreal were present.

Work of Electrical Estimators' Association of Chicago

By J. O. Wingate

A few weeks ago at a regular meeting of the E. C. A. in Cleveland, the writer brought to their attention the necessity of organizing a club or school for estimators. The object of this school would be for the promotion of the social, mental and material status of members. Raise the standard of estimates to be submitted on electrical installations by the following methods:

Educate estimators in proper methods of taking material from plans and specifications. Develop standard forms for recording and pricing the various items entering into estimates. Standardize labor cost by discussion of actual conditions occurring on the work. Investigate and determine the amount of overhead percentages to be applied to any particular estimated cost of installation. Improve plans and specifications by demanding that plans show distinctive and clear symbols for each type of outlet or apparatus, and specifications to be explicit in describing the work to be installed. Educate architects and engineers as to fair compensation for alterations and additions. Discuss all other subjects that may be found from time to time to enter into or be of interest to the electrical construction business.

In estimating work there is that responsibility or confidence the contractor places in his estimator to let him compile list of material and labor for the complete installation of a building. The confidence the contractor places in this estimator gives him a chance to go out into the field to secure business at a loss or in most cases a very close percentage of profit. The very close percentage of profit is usually brought about by the estimator estimating on a number of jobs, and not being successful begins to shorten up on his rule or underestimates his labor until after a while he will land a job. This kind of estimating adds no credit to the estimator and the contractor has to suffer from the mistakes and bad judgment. I think that the estimators in organizing a school will very materially help to better conditions for electrical contractors throughout the country. I would suggest that the estimators in different localities get together with their employers and work out a plan best fitted for their home conditions. Now is the time to get together, exchange ideas, educate each other and arrive at a fair cost for installing material that the contractor may may realize a fair and just profit for his work. If the estimator is successful in securing one carefully estimated job it is by far more beneficial to him and his employer than trying to get in on everything that comes along and give but little time and no consideration to what he is figuring. There is this we estimators have to contend with in approaching the subject to our employer. Your employer may say to my employer, "I don't think much of this estimating school. I have my way of running my work and if my estimator is not satisfactory to me I will let him go and get another." This privilege all contractors have, but it will not help his condition or the estimator's, for the estimator is in the same position as labor. He goes from one contractor to another seeking employment. And you are just as liable to get an estimator that is no more fitted for the position than the one you let go. So with the help of the contractors in encouraging their estimators to help one another by forming this school of development we can become more efficient and be of greater value to you as estimators.

The estimators of Chicago do not confine their membership to estimators only estimating for electrical contractors who belong to the electrical contractors' association, but encourage anyone estimating electrical construction work for an individual, a firm or company actually engaged in the installation of same. The estimators of Chicago organized without consulting the contractors and at first did not work in harmony with them, but after a few meetings had been held and they had their organization in pretty good shape they invited the contractors to attend one of their open meetings. The working conditions of the estimators' association along with data, etc., were presented to each contractor and explained how same could be brought about for the betterment of both parties concerned. How they would educate the estimator and in educating the estimator would be of great benefit to the contractor. To-day the electrical contractors of Chicago think the Estimators' Association far exceeds any other association in the city of Chicago. And several electrical contractors, doing their own estimating now belong to the same. They have a very complete list of estimating data which they are willing to distribute to electrical estimators at about the cost price of same. Also their report on labor data, which was presented at the National Convention of Electrical Contractors and Dealers in Cleveland last July.

Have You a Fixed "Policy"? Do You Follow It? Do Your Employees Know About It?

Every business man should have a "policy," which governs his operations. This does not except the contractor-dealer. By this we do not mean a very general and hazy plan of operation but rather a definite written-down policy that every man, woman and child in the organization can **read**, and which will form a guide for their daily activities. About as definite an outline of a working policy as we have seen is published by the Society for Electrical Development in the last issue of their Sales Service magazine. This particular outline is attributable to Mr. Wm. J. Share, a New York electrical contractor, but it is applicable with minor adjustments to electrical contractors in other cities. Following are the policies adopted by Mr. Share with respect to (1) competitors, (2) customers, (3) employees, (4) purchases, (5) bank, (6) Business—Selling, productive, financial, administrative.

Policy with respect to Purchase: (1) I buy on Quality, net price, (2) I prefer advertised merchandise, (3) Selling concerns must have excellent and intelligent help, (4) Prompt deliveries, (5) Promises must be kept, (6) Assistance in case of emergencies, (7) A liberal Policy in adjusting errors and complaints, (8) Goods checked before shipment, (9) High grade guaranteed goods, (10) All bills are discounted, (11) Purchases are concentrated to one firm in each line.

Policy with respect to my Bank: (1) To consult them on all matters financial, (2) To consult them regarding doubtful accounts, (3) To maintain a fair balance, (4) Never to overdraw my account, (5) To send them financial statements twice a year.

Policy with respect to my Employees: (1) To engage a high grade of help, (2) To pay a fair salary and expect a fair return, (3) To treat them with consideration, (4) Not to expect something for nothing, (5) To offer constructive criticism instead of destructive criticism, (6) To give them steady employment, (7) To let them know their services are appreciated.

My policy with respect to Competitors: (1) To consider them as honest men engaged in an honest business, (2) As willing to help me out in emergencies with help or information, (3) To work with them in an effort to improve conditions in the business through associations, (4) To speak well of them on all occasions.

Are you prepared for the hot-weather-Fan season? Plan your campaign now.

My policy with respect to Customers: (1) To make good on all promises, (2) To treat them with courtesy at all times, (3) Not to take advantage of their ignorance of matters electrical, (4) To handle their complaints with despatch, (5) To keep their equipment in continuous operation, (6) To be liberal in adjustments of defective material and workmanship, (7) To give them the benefit of any doubt, (8) To deal only with high grade concerns of good standing and reputation, (9) To maintain pleasant relationships, (10) To collect accounts promptly when due.

My policy with respect to the business of Selling: (1) To believe in the efficiency of advertising and to advertise, (2) To sell on a Quality Basis, not Price, (3) To sell my goods and services only to high grade and reputable concerns of good standing, (4) To make my proposals complete in every detail, covering a description of materials furnished, time of installation and delivery, price, terms of payment and guarantees, (5) Not to depend on verbal orders, (6) To depend on recommendations of satisfied customers in obtaining new work, (7) To make no promises or statements that cannot be kept, (8) To keep a record of all proposals prepared, number accepted, number lost and reasons why.

My policy with respect to Financial Matters: (1) To maintain and operate a good Cost Accounting system for the purpose of determining (a) The financial condition of the business at any time, (b) The progress of the business from time to time, (c) Amount of accounts payable, (d) Amount of accounts receivable, (e) Profit or Loss on each job, (f) Monthly and yearly overhead charges. (2) To collect accounts receivable promptly, (3) To pay accounts payable promptly, (4) To set aside a certain percentage of gross income for reserve for (a) Bad debts and other contingencies, (b) Advertising. (5) To earn a net profit of 10 per cent on gross amount of business done, (6) To reinvest profits in the business, (7) To accept no work unless a profit is shown.

My policy with respect to Installation of Equipment: (1) To supply competent and reliable help, (2) To start work promptly and carry it through without intermission or delay, (3) To leave no part of the work unfinished, (4) To maintain the highest standard of workmanship and material, regardless of inspection, (5) To prepare careful and complete estimates on all proposals submitted.

My policy with respect to my Business: (1) To subscribe to all trade journals, (2) To join all associations pertaining to my business, (3) To participate in all their activities, (4) To increase my acquaintance with the best men in the business, (5) To regard the business of electrical contracting as a good business and one worthy of the highest and most intelligent effort.

Whose Duty is it to Develop the Electrical Industry? Who is Doing it? The Contractor-Dealer's Course is Clearly Marked Out

By Samuel A. Chase

So much has already been said on the subject of co-operating and various methods suggested to improve all branches of the electrical industry that it is difficult to say anything new, but possibly the same old story repeated will gradually have its effect, and already we can see a marked improvement along all lines, principally in the way of better merchandising methods on the part of the Contractor and Dealer.

In some districts the Contractor and Dealer have been alive to the situation and opportunity offered and have profited by the wave of enthusiasm which has awakened the entire industry through the efforts of Mr. Goodwin and have either opened new stores or enlarged and improved old stores and are selling incandescent lamps and various electrical appliances with profit to themselves and convenience to the buying public.

In other localities the Contractor-Dealer has not been alive to the situation, and Central Stations as well as the buying public complain that advantage has not been taken of the opportunity given by the central stations and the manufacturer, and incandescent lamps or electrical appliances are not sold in attractively arranged stores located conveniently for the buying public.

Central stations, backed up by the manufacturers, are realizing that to retail incandescent lamps and household appliances, excepting on a strictly business basis, taking into consideration the cost of doing business and the maintenance of a retail establishment, is the height of folly and disregards the ethics of the Electrical Industry in that it does not follow the slogan of "Live and Help Live" because it does not recognize the service rendered by the Contractor-Dealer and his cost of doing a legitimate retail business.

But, gentlemen, the Contractor-Dealer must respond and meet the situation and arrange attractive retail stores, located conveniently to the buying public; otherwise, the central station, the jobber and the manufacturer will seek other channels of distribution—possibly selling direct or through distributors outside the electrical industry.

The Dealer Must Be a Merchant

One of the principal criticisms of the Manufacturer in the past has been that **the average contractor-dealer does very little to create a demand for the sale of household and other electrical appliances to the consumer.** In other words he has not been a merchant.

If the Contract-Dealer will become a real merchant, there is no department of selling in which the manufacturer and jobber will not be ready and anxious to help him. Suitably advertising matter will be furnished; salesmen instructed and attractive window displays suggested and the manufacturer, jobber, central station and contractor-dealer will go hand in hand down the road of business prosperity.

I believe it pertinent at this time to emphasize that the manufacturers believe that the electrical dealers as a rule have not been as active as they should be in the sale of motor driven devices and there is a great possibility in this field.

Take for instance, six of the commonest electrically-operated machines used in the home—the washing machine, the sewing machine, the ironer, the vacuum cleaner, the fan motor and the polishing and grinding motor. All of these classes of apparatus have been developed to a high degree, are manufactured in very large quantities and should be universally used wherever electricity is available.

The fact that electrical dealers have overlooked this possibility is noticeable since a number of new concerns have sprung up who do nothing but handle devices of this kind, adding to their line a full line of heating apparatus. Such dealers can now be found doing a profitable business. Their stock in trade consists of an attractive display room in a district frequented by women on their shopping tours, generally some advertising, and in some instances, solicitation through the residential district.

The electrical dealer has been slow to get into this particular field and I believe that in order to handle devices of this kind, he must have an attractive store, he must be in a position to do extensive solicitation, considerable newspaper advertising, and render service, from time to time in connection with such devices as he has sold.

It is true that either an attractive display room or else a system of house to house canvassing with samples furnished free of charge is necessary. Newspaper advertising has also been effective, if the advertisements are properly timed and carefully prepared. The question of service is furthermore necessary, but successful electrical dealers make their service feature one for building up additional business. In other words, their service men who go to repair or adjust any device sold, open up sales for other classes of apparatus. They distribute literature and report prospects to the office, which are followed up systematically and energetically.

A good illustration of this service feature is that pursued by a concern out west which has recently put on the market a farm lighting outfit. The sales organization of this company feel that they are just starting when they sell the farm lighting outfits. They follow up the prospects with all sorts of electrical devices, such as fans, house pumps, washing machines, ironers, sewing machine motors and small motors for general power purposes. Their prospect becomes a regular customer for lamps. He undoubtedly will make extensions in time in his wiring and will require supplies. Thus, they become the sole supplier of the farmer's needs along electrical lines. If more of the elctrical dealers would pursue a policy like this they would, undoubtedly, build this business up enormously.

It would pay the electrical dealers to get in touch with the manufacturers of small motors and electrically operated devices used in the home. On the most expensive of these, extension time payment plans are now worked out which enable the householder to finance purchases which he could not think of financing if he were required to raise the necessary cash.

This is a time of great economy. There are many tens of thousands of electrically driven washing machines being sold each year and this number is increasing in spite of the increased cost of living, due solely to the fact that they are reliable labor service. Many women are dispensing with their laundresses and either handling the washing machines themselves, or doing so through the maid of all work they usually employ. This means a direct weekly saving which will pay for an electrically-driven washing machine and ironing outfit before many weeks pass by.

Likewise, in the sewing machine motor, there never was a larger demand than there is at the present time in connection with a large amount of clothes that are being manufactured and the enormous amount of Red Cross work which is being done. These same arguments apply to the other devices I have named, and there is no question in our minds but what the next two or three years are going to show an increasing demand for labor saving devices.

The electrical dealer has not been alive to this situation in many localities. Manufacturers have had to establish their own branches for retailing these electrically-driven devices, and a special class of dealer has sprung up simply because the electrical dealer has not realized the opportunity and modified his business methods to meet this new condition.

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*At meeting of Connecticut Association.

Several dry goods stores as well as hardware and other retailers outside the electrical industry have profited by this opportunity during the past few years and materially increased their electrical departments.

Electrical manufacturers and manufacturers of motor-driven machines used in the household have worked out quite extensive selling campaigns based on experience gathered in the field, which is all furnished to the electrical dealer gratis, as well as other literature and sales helps.

I don't know that I blame the contractor-dealer for not going into the retail business excepting in the recent past because as you know until recently there was no stability in prices—in other words, the service rendered by the retailer in carrying stock and operating a retail establishment was not recognized; but now under the new order of things the manufacturer, the jobber, and the central station recognize the service rendered by the contractor-dealer and all desire to co-operate.

In recent talks during meetings of your various local associations I have mentioned a new slogan "Live and Help Live" which I believe is preferable and better fitted to the electrical industry than "Live and Let Live"; but I have been wondering if the industry as a whole is in an attitude of mind to follow the slogan "Live and Help Live" and if not ready at this time to do this, further educational methods are necessary before a definite plan of merchandising which will safeguard the best interests of all can be put in operation.

What I mean by this is, is the contractor-dealer ready and willing to do his part and become a real merchant, co-operating with the jobber and manufacturer and establish attractively arranged retail stores, and assist in every way in this great problem of distribution of electrical appliances from the manufacturer and jobber to the consumer, co-operating with them and with the central station?

Is the manufacturer, the jobber, and the central station management in the right attitude of mind to realize the importance of the contractor-dealer and the service he renders in this problem of distribution to the ultimate consumer to co-operate in every way and make it possible to distribute these products on a proper business basis?

All classes in the industry with few exceptions seem to be impressed with the desirability of adopting this slogan or "Live and Help Live" and it is up to each and every one of us to do our share. We desire to learn the contractor-dealer language; so we can thoroughly understand it.

I do not believe that any branch of the electrical industry has at any time been disposed to deprive the contractor-dealer of the right and opportunity to transact a retail business on a profitable basis, but the difficulty has been in the past that the manufacturer, the jobber or the central station has not fully understood your problems, and could not talk in your language, neither did the contractor-dealer fully understand their problems; so that **it has become necessary and always will be a necessity for all classes to get together and discuss these problems in open meetings.** This is being done in many districts, and joint meetings of all classes have been held with great success, whereas previously the jobber, the manufacturer, the central station as well as the contractor-dealer, would each hold their meeting behind closed doors inviting no one excepting members of that particular branch of the industry—therefore, very little was accomplished in the direction of co-operating as in a spirit of "Live and Help Live."

Change is the fundamental of economic progress. To recognize and accept the probability of a change is one-half of the problem; to see its direction accurately provides the ultimate solution, and we believe there is a changed condition the result of which is already showing great benefits to the industry as a whole and particularly to the contractor-dealer.

Why not discuss and formulate definite plans and appoint active committees on such subjects as:

A—House wiring campaign throughout the provinces, including time payment where necessary.

B—The establishment of retail stores.

C—The selling of electrical appliances such as vacuum cleaners, washing machines, sewing machine outfits, and other electrical appliances on an installment plan of payment.

D—Devise ways and means to so wire the kitchen and the dining room that such appliances as irons, percolators and toasters can be easily and safely used. Many now are using their appliances simply as ornaments on the dining room sideboards because of the fact that proper outlets are not provided enabling the housewife to easily and quickly use them without disturbing the lamp in the fixture over the dining room table, and the cords suspended over the table are unsightly and the ordinary wiring as you know is inadequate.

E—Divide your territory and large cities up into zones and place active sub-chairman in charge of each zone who will carry out the plans of the general committee in the endeavor to increase business and co-operate with other classes in the industry.

F—Appoint a committee to meet committees of other Associations, such as jobbers, manufacturers, and central stations with a view to establishing closer relations and as an inspiration to get together and keep together.

Hold meetings together and leave the door open at all meetings.

Selling Up, and Selling Down

By Sidney New

When you buy a tooth-brush at the drug store, the clerk is more than apt to suggest a tube of tooth paste. When you buy a collar at the haberdasher's, the clerk will suggest a new tie or a shirt. The least that any store clerk, in a mercantile line, will do is ask "Is there anything else?"

If you ask to see a two-dollar shirt it will be shown you, but the clerk won't stop there—he will bring out some three-dollar ones, and five times out of six you buy the more expensive one.

Processes such as these are called "selling-up." They require some tact and skill, but they result in increasing sales from fifteen to fifty per cent, without increasing selling expense, and therefore, in some lines of business, double the profits.

But, what would you think of a store-clerk who, when you asked to see a three-dollar necktie suggested that you buy one for two-bits. If you went to buy a desk for your office and had picked out one you liked and the salesman suggested that you take another with half as many drawers and with rough splinters along the edge, saving $6.23, would your opinion for that store rise very high? It would not.

You never experienced the process of "selling-down" because "it isn't done"—except in the electrical business. And there it is done with a vengeance.

Mr. Ownahouse wants his house wired. He sends for John T. Wiringman, a reputable contractor, to figure the job. John T. figures a centre outlet, a side outlet, and a snap switch outlet for every room in the house—he knows if he puts in any convenience outlets, the figure would be, oh, very much too high. Ownahouse gets the figures and whistles. "I didn't know," he says, "that it would cost so much."

Right there John T. gets nervous about the knees. Does he explain that the figure is reasonable, that he was even about to suggest additional floor outlets in the dining room for table appliances, extra outlets in the bedrooms for curling irons, warming pads, radiators and other conveniences, in the sewing room for a sew-motor and an iron, and in the bathroom for a radiator, and so on? Does he "sell up" as the cheapest clerk in a store would?

Not if he is the John T. Wiringman that we have met His first suggestion is that Mr. Ownahouse may be able to get along without side lights in the bedrooms. Then the centre outlet in the kitchen goes. Next goes the bathroom switch. Finally the customer gets a job at about one-half the original figure, that isn't much of a job.

Next week Mr. Ownahouse buys a toaster-stove. If he could use it conveniently, he would add a percolator and a number of other appliances. His wife cannot use her iron without turning off her light. The result? One of two things—either Mr. Ownahouse gives up the use of electricity in disgust using it only for light, or if he has abounding faith he brings a so-called "electrician"—not the reputable John T. Wiringman—has the convenience outlets installed without reference to Underwriter's rules, and tries to be satisfied.

Plan your window display of Electric Fans.
Let people know where to buy them.

Who suffers when John T. skins down his figures? First of all John T. suffers, because he has reduced the volume of his business and reduced the profits he ought to make.

Second, John T. suffers because Mr. Ownahouse blames him for not providing enough outlets.

Third, John T. suffers because he loses the possible sale of electrical appliances that would just fit the missing outlets.

Fourth, the customer suffers because he cannot avail himself of the electrical conveniences he should be able to use.

Fifth, the central station suffers because it loses the increased revenue without increased capital investment it ought to enjoy through Mr. Ownahouse's meter.

Sixth, the whole electrical industry suffers. It has received another black eye.

And who gains? Possibly the "so-called" electrician.

Vancouver Convention an Important Event

The electrical convention of the Vancouver Association of Electrical Contractors and Dealers on May 26th and 27th, was a splendid success and will be reported fully in our next issue. The programme included addresses by W. L. Goodwin and S A Chase; also Wm. McNeill, assistant general-manager Western Power Company; W. G. Murrin, assistant general-manager British Columbia Electric Railway Company; F. Jno. Bell, general-manager Canadian Wire & Cable Company; R. E. Callahan, manager Toronto branch Majestic Electric Supplies, Limited; H. B. Kirkland, general-manager American Conduit Company; Frank T. Groome, sales-manager Benjamin Electric Manufacturing Company; A. S. Edgar, special representative C. G. E. Company; A. J. Soper, distribution-manager Northern Electric Company. The arrangements were in charge of the following committees:

Organization Committee: Jno. Read, E. A. Walker, S. E. Jarvis, J. E. Rowland, C. Moulton, J. J. Crossman, R. A. Graham, J. Duck, S. R. Smith, E. Brettell.

Finance Committee: C. H. E. Williams, F. Williams, H. Rees, J. E. Rowland, E. Brettell.

Reception Committee: Every member of the Vancouver Association.

Mr. and Mrs. E. G. Mundy kindly consented to take charge of the arrangements for the entertainment of the ladies.

Electricity in the Largest Hotel in the World

The new Hotel Pennsylvania, at the Pennsylvania Terminal, New York City, has 2,200 rooms, each with its bath, and is the largest hotel in the world. It was also planned to be one of the most modern, convenient, and comfortable, and consequently electricity plays a large part in its service to guests. Special precautions have been taken to prevent the failure of the supply, arrangements having been made to supply current from three independent sources—from two stations outside of the building and from a generator inside. The lights are operated from three separate circuits, and some of the lights in each corridor, and at other emergency points, are lit from each of these circuits so that even if trouble developed on two circuits at the same time, no important part of the hotel would be plunged into darkness.

Electrically operated potato peeler

Ice is finely chopped by electric motors

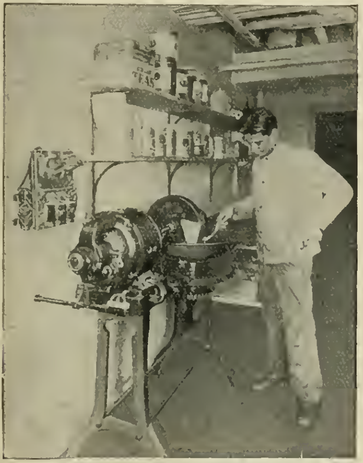
The guest is constantly meeting novel applications of electricity. When he enters his bath-room, the first thing he notices is a faucet, labelled "ice water," which is supplied by an electric pump in the basement. Should he order his breakfast served in his room he receives it in a surprisingly short time, and the secret of this rapid service is the electric breakfast kitchen located on every one of the guest floors. These kitchens are equipped with electric coffee percolators, stoves, toasters, egg-boilers, and other cooking utensils. Each one also has a "cold box," or refrigerator, set in the wall and kept cold by refrigerated brine circulated by an electric pump.

The air in the restaurants and other concourse rooms is fresh and pure in spite of the many people and the smoke from hundreds of cigarettes and cigars. This is due to the fact that air for these rooms is drawn in from the outside by electric ventilating fans, forced through cheese-cloth filters, washed in running water, and heated in winter and cooled in summer; the foul air is drawn out by exhaust fans. Each of the 2,200 bath-rooms is also ventilated by exhaust. Twenty seven Westinghouse motors operate these fans, and 800 tons of sheet metal were required for the ventilating ducts.

Two twenty-horse-power motors drive vacuum cleaners that draw dust and dirt from 487 openings and carry it through a total of three miles of pipe to dust receptacles in the cellar.

Electric Kitchen and Laundry

A trip through the kitchen and other service departments brings to light many other interesting tasks performed by electricity. There are electrical grills and ovens, electrical potato peelers, meat choppers, cake mixers, and dishwashers. There is also an electric machine that cuts ice into cubes for the water glasses, crushes it for iced drinks, and "snows" it for cooling bottles, etc. The laundry, which is one of the largest private laundries in the country, is electrically operated throughout.



Motor-driven chopping machine.

Perhaps the most unique electrcial machine is the one that reproduces writing and is used to convey instructions throughout the hotel. These machines can be seen in operation at various points, and to watch the pen of one of them busily spelling out a message in the handwriting of someone perhaps twenty floors below, is fascinating and somewhat uncanny.

One of the inconspicuous, but very modern, features of the electrical equipment is the switch panels for controlling the lighting circuits on the various floors. These panels differ from the ordinary type in that it is impossible for anyone operating the switches to come in contact with live parts. Hence they are absolutely safe and can not cause injury to the operator. The fuses and connections are locked in a separate compartment and are accessible only to authorized electricians.

Ball Bearing Manufacturers Combine

Of interest to all users of bearings is the announced reorganization, effective May 1st, whereby the products of The Hess-Bright Manufacturing Company, the SKF Ball Bearing Co., the Atlas Ball Co., and the Hubbard Machine Co. will be sold through one central organization. The new company, under the name of SKF Industries, Inc., will thereby be able to offer a comprehensive line of ball bearings, including the Hess-Bright deep-groove type, SKF self-aligning radial and thrust bearings and ball bearing pillow-blocks and shafting hangers. Through the medium of its engineering organization, backed up by a well equipped laboratory, the new company will be able to place at the service of bearing users the knowledge gained in many years study of anti-friction bearings of all kinds. On request, manufacturers' problems will be analyzed in detail and that type of bearing recommended which (independent of sales consideration) is best suited to the conditions met. In addition the laboratory staff will carry on research studies affecting anti-friction bearing design and application. The new company, SKF Industries, Inc., will be under the direction of B.G. Prytz, president. W.L. Batt, vice-president. J. P. Walsh, comptroller, and S. B. Taylor, sales manager. The principal office will be at 165 Broadway, New York city, with branches at Boston, Philadelphia, Atlanta, Buffalo, Cleveland, Detroit, Cincinnati, Chicago and San Francisco.

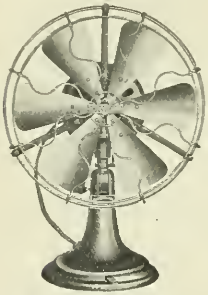
The Henry Engineering Co.

The Henry Engineering Company announce that they have opened offices at 71 Bay Street, Toronto, where they have established themselves as consulting engineers on general engineering work. They have also opened a department at this address, which will specialize in the purchase and sale of power equipment of every kind—steam, electrical and hydraulic—both new and used. The new company will continue to handle the special agencies carried in the past by Mr. Thomas Henry, at 58 Front Street West, and will also, from time to time, add other lines of engineering equipment and supplies.

The company is composed of Mr. Thomas Henry, Mr. James A. Rumgay and Mr. Edwin B. McBryde. Mr Henry was for many years chief engineer of The Interurban Electric Company, Limited, and The Erindale Power Company, Limited, having been solely responsible for the design and construction of the development plant and transmission system of the latter. Later he was associated with the Sales Department of the Toronto Electric Light Company, and for the past year and a half has been carrying on a general consulting and sales agency business under his own name at 58 Front Street West, Toronto. Mr. Rumgay was for some years with the Canadian Allis-Chalmers Company as draftsman and estimating engineer. More recently he has held the position of designing engineer and manager of the boiler department of the Polson Iron Works, Toronto. Mr. McBryde is also widely known. He had an extensive operating experience, covering several years in England, which was followed by a similar experience with the Toronto Electric Light Company, where he was assistant superintendent of distribution, and later assistant sales manager. For the last two years he has been manager of the Fisher Electric Company, Toronto, handling new and used electrical equipment.

Twelve and Sixteen Inch Oscillating Fans

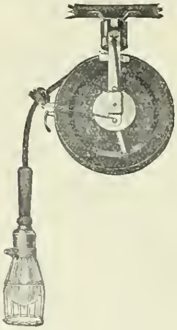
The illustration herewith shows a six blade oscillating fan manufactured by the Dayton Fan and Motor Company, Dayton, Ohio. This style is made in 12 and 16 in. sizes and is convertible to bracket position. The company have just started work on a new $150,000 factory building upon which construction will be rushed to completion by the end of the summer. The plant will measure 150 feet by 80 feet and have a floor space of about 75,000 feet including five storeys and basement. The officers of the company include Mr. Charles P. Schnaus, chief engineer, with whom is associated Mr. Ward Houston, formerly production manager for the Robbins & Myers Company and Mr. U. B. Unger, superintendent.



Six blade 12 or 16 inch Oscillating Fan, convertible to bracket position.

Automatic Extension Reel

The design shown in the accompanying illustration shows the automatic extension reel for electric lamps which is being placed on the Canadian market by the Cincinnati Specialty Manufacturing Co. The actual size of the reel is 9 inches in diameter by 2 inches in width, supplied with 25 feet of reinforced weatherproof cord. The head is provided with a swivel joint, enabling the lamp to be carried in any direction from the reel, and an automatic lock permits a positive stop at any desired point. This apparatus thus allows one to take the light exactly where it is wanted, eliminating the necessity of dragging cords over the floors, breaking the insulation and increasing fire hazard. It represents an actual saving in cord, lamps, fuses and guards. The insulating features of the reel have been well taken care of, as the connections have withstood an Underwriters' Laboratories' test for 1250 volts.

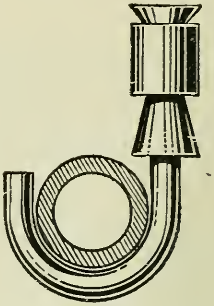


Automatic Extension Reel—Cincinnati Specialty Co.

The C. G. E. are putting on a big Fan campaign to help the contractor-dealers.

Conduit Hanger on New Principle

In the accompanying illustration a new conduit hanger is shown which is being manufactured by the Chicago Expansion Bolt Company. It has a U-shaped body to receive the pipe, one side of the U being provided with an expansion feature to secure it to the wall or ceiling. The maker states that the fixture costs no more than an ordinary expansion bolt. It is also claimed that as no other fixture with separate bolts and nuts is required it makes a material saving both in labor and material costs in fastening conduit lines. It is made in sizes adapted to all sizes of conduits and is furnished in either galvanized black or plain finish.



Conduit Hanger by Chicago Expansion Bolt Co.

You have a dollar.
I have a dollar.
We swap.

Now you have my dollar.
And I have yours.

We are no better off.

You have an idea.
I have an idea.
We swap.
Now you have two ideas.
And I have two ideas.

That's "some" difference.

New "Devoe" Switch

The Devoe Electric Switch Co., Montreal, are making an improved type "A" externally operated safety service switch. The company draw attention to some unique features of construction; one is the action of the moving arms, which gives uniform motion to the switch blades, whereby the three blades enter their contacts at the same time. The square steel operating rod is designed to act only as an axle, moving the arms, and, it is claimed, is not subjected to strain or twisting which distorts the contacts and the blades of the switch in operating. Another feature is that the switches are so made to secure the high rate of 90 to 95 per cent. contact at the hinge and jaw joints.

Mr. Kenneth A. McIntyre, chairman of the Toronto branch of the Ontario Association of Electrical Contractors and Dealers, met the Brantford Association a few evenings ago and discussed with them the advisability of this becoming a branch of the Ontario Association. The matter is being further considered as the majority of members appeared favorable to affiliation.

How I Increased My Sales 100%

Most of us are unsystematic. We conceive an idea and follow it up to a certain point. Then something intervenes, or we get the idea we are not making headway and—stop. This is not the way to accomplish results.

How often can you recall cases in your sales experience where you have done a lot of pioneer work and failed to land your customer? Why did you fail? It must be because you stopped too soon. Your judgment in the first place was that your customer was a good prospect. Surely then, he was a still better one after you had worked on him for some time. Do you admit that your judgment was at fault? Of course not. Now this applies very specially to the electrical contractor-dealer. He needs to keep everlastingly hammering away at his customers until they **get the habit** of electrical appliances. Never give up—because you're **right.** Sell the electrical idea—what it means in the home.

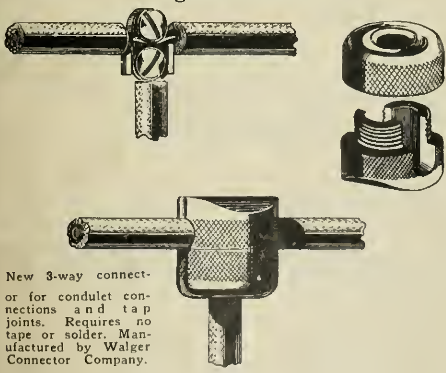
A friend contractor-dealer of mine specializes in house-wiring—new homes for the most part. He's a gentlemanly fellow and makes a point of getting on good terms with the owner and, indeed, so far as is possible, with everyone on the job. Then when the wiring is all done, instead of going away and forgetting all about it, my friend just begins to get busy.

You all know what a muddle things are generally in on "moving in" day and often enough for several days after. Generally no range connected up, perhaps cold weather and furnace not going properly, or very hot and no electric fans, etc. Well, recently this contractor-dealer certainly cashed in on his opportunities. By keeping in touch with the house-owner, he knew when moving day arrived. It turned out to be hot and sultry. What did Mr. Contractor-Dealer do? Early in the morning he ran around to the house with a fan, a toaster, a percolator, a chafing dish, a little two-element hot-plate and a vacuum cleaner. "Help yourself," he told the lady of the house. "I know what moving is because I've moved myself."

Of course, this couldn't have been done unless the contractor had taken the precaution to have a few judiciously placed base board outlets put in previously. As it was, the lady was the most grateful person you ever saw. More than that, she had been sold the **idea** and not a single item of the list was allowed to return to the dealer, except the chafing-dish which she replaced by a good sized range. Since that time, by still keeping in touch with this house, the contractor has sold several more articles. Just now he is installing a washing machine because he came in one day at an opportune moment when the wash lady had just sent word she was "not very well."

This policy of following up and keeping in touch with his customers is now consistently followed by this contractor-dealer, who advises me that on more than one occasion his sales of equipment have amounted to more than the original wiring job and that they carry a bigger profit.

Walger Connectors



New 3-way connector for conduit connections and tap joints. Requires no tape or solder. Manufactured by Walger Connector Company.

The Ideal Commutator Dresser

To avoid the necessity of having to turn down commutators on a lathe the Ideal Commutator Dresser Company, of Chicago, manufacture an abrasive block with which they say commutators may be re-surfaced and kept in smooth running order without even taking the load off the motor. The Ideal Resurfacer is not a natural stone but a manufactured product of uniform density and cutting quality throughout. It is pointed out by the company that natural blocks are sometimes soft and clog easily with copper dust. By the use of this re-surfacer the Ideal Commutator Dresser Company say a seven hour job on a lathe may be cut down to one hour and better results secured. A ten day free trial is offered as evidence of their faith in the Ideal Resurfacer.

Dress the Commutator while in operation.

The Emerson Fan

McDonald & Willson, Yonge St., Toronto, have taken the agency of the well known Emerson Fans, recognized as standard equipment in the United States. These fans carry a five-year guarantee. McDonald & Willson will carry a complete stock so that prompt shipment may be made at all times.

McDonald & Willson have agency for Emerson Fans.

Current News and Notes

Burlington, Ont.

The Burlington town council have contracted with the Dominion Power and Transmission Company, Hamilton, Ont., for a supply of electric energy for a further five years. It is stated the Ontario Hydro offered practically the same rates but their proposal was turned down.

Calgary, Alta.

Street railway fares in Calgary, Alta., have been increased to a straight five cents.

Edmonton, Alta.

The deficit of the Edmonton Street Railway for last year is less by about $20,000 than the previous year. This is attributed largely to the introduction of one-man cars. Greater savings are anticipated for the year 1919 as all cars will be of this type.

Estevan, Sask.

A press report from Estevan, Sask., states that lignite briquettes will be manufactured on a commercial basis about the end of October. The Lignite Utilization Board, however, state that there is still a great amount of experimental work to be done.

Fredericton, N.B.

The annual report of the New Brunswick Telephone Company, recently submitted, shows assets of $2,628,962; liabilities $2,614,112, leaving a surplus of $14,850. This is after deducting a dividend amount of $31,869. Earnings for the year ended March 31, 1919, totalled $649,016. Expenses amounted to $542,097. President S. H. White, in his report, stated that it would be necessary to ask for permission to increase their rates.

Hamilton, Ont.

The Hoover Suction Sweeper Company, of North Canton, Ohio, have plans under way for the construction of a factory at Hamilton, Ont.

The Hamilton Lamp Company, Limited, have been granted letters patent. Capital stock is $300,000 and head office, Hamilton, Ont.

Marysville, N.B.

The town council have under consideration the installation of an electric lighting system.

Montreal, Que.

The annual statement of the Montreal Light, Heat and Power Consolidated, to be presented at the annual meeting on June 5, shows a net income, after charges and depreciation, for the twelve months ended April 30, of $3,605,181, an increase of $16,458 over the previous year. The gross revenue for the year amounted to $10,939,272, an increase of $548,588. Operating expenses ,however, increased by $589,623, the total being $5,357,492. The total surplus is $2,608,204. Sir Robert S. Holt, the president, intimates that an increase in rates may be necessary if operating expenses continue to rise.

The Radio and Electrical Supply Company, Montreal, have registered. Mr. Wm. T. Hawes is proprietor.

The Marconi Company will erect a long distance wireless station in Montreal to handle some of its trans-Atlantic business. This station will work direct with Paris.

Niagara Falls, Ont.

It is stated that difficulties between the Ontario Hydro-electric Commission and the two thousand men at work on the new power canal have been settled amicably. A general strike was threatened.

Orillia, Ont.

The town council have under consideration the placing underground of all electric wires on the main street.

Regina, Sask.

The electric light department of Regina, Sask., shows a surplus of $21,290 for the first four months of the year. The deficit on the municipal electric railway, however, is $9,150 for the same period.

It is stated that the city of Regina may commence in the near future the distribution of electrical energy to some of the towns and villages within a radius of twenty or thirty miles. The town of Lumsden have a definite proposal under way to submit to the Regina city council. Such a transmission line would also serve the farms along the route.

Roberval, Que.

The town council of Roberval, Que., contemplate repairs to their hydro-electric plant, which operates under a 50-foot head. They will probably require a new turbine and generator, together with exciter and necessary switchboard equipment.

Shawinigan Falls, Que.

The town council of Shawinigan Falls, Que., have under consideration the expenditure of some $35,000 on a new system of street lighting.

Toronto, Ont.

Mayor Church, of Toronto, has moved that a by-law be submitted to the ratepayers at the next January elections to provide for the expenditure of $5,000,000 as a preliminary step toward taking over the Toronto Street Railway in 1921. The Transportation Committee will prepare a report on the matter.

Windsor, Ont.

The Sandwich town council have declined to adopt a by-law authorizing a fare increase for the Sandwich, Windsor and Amherstburg Railway which it was intended to submit to the ratepayers on June 14.

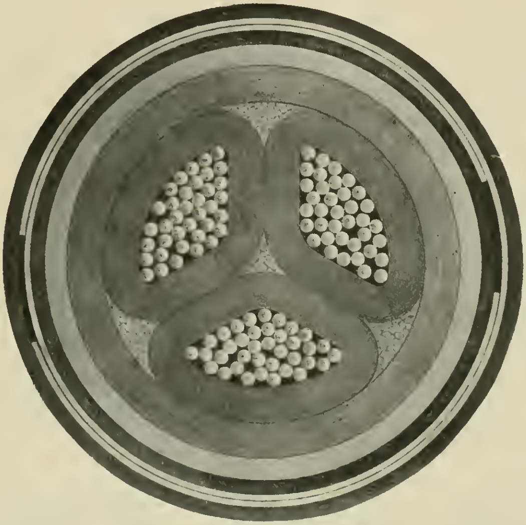
National Board of Fire Underwriters

gave their approval to Allen non-acid sodering fluxes after testing them for nearly two years between the time we submitted samples and the time their report was issued. And, thus far, no other sodering fluxes have been approved. Send for samples.

Bissett & Webb

126 Lombard, Winnipeg, Man., Canada

POWER CABLE



350,000 C.M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable
Overall Diameter—3.62 ins.

Built to Specifications of Hydro-Electric Power Commission of Ontario

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Eugene F. Phillips Electrical Works, Limited
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Branches: Toronto, Winnipeg, Regina, Calgary Vancouver

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Publisher's Notice

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

For Sale

75 Kw. Bullock generator, 3-ph., 60 cy., 900 r.p.m., run 3 years, perfect condition. Box 949 Electrical News, Toronto. 11

WANTED

A practical Electrician, capable of adjusting and repairing motors and domestic appliances. A good chance for advancement.

Address,

HYDRO ELECTRIC COMMISSION,
10t.f. St. Thomas, Ont.

COMPETENT ELECTRICAL AND MECHANICAL ENGINEER, shortly emigrating, seeks position in charge of Works or Factory Plant, nine years first class varied experience, including two years' Admiralty experience, with Suction Gas Plants, all types of Internal Combustion Engines, Steam Engines and Boilers, direct and alternating current machinery, Chemical Plant. Young, ambitious, good organizer. Toronto district preferable. Communicate Siddall, 75 Lydyett Lane, Barnton, Northwich, Cheshire, England. 11-12

Representation Wanted

Manufacturer of Alternating Current motors wishes active representation in Toronto and vicinity. Box 936, Electrical News, Toronto.

Steel Trolley Wire Being Substituted for Copper in Los Angeles

The substitution of steel trolley wire for copper wire has just been begun by the Los Angeles Railway Company. Officials of the company state that they have been unable to obtain a sufficient supply of copper wire to care for their maintenance needs and that the price of copper wire is so high as to be practically prohibitive. They feel that steel wire is not nearly as good and as it is much heavier it requires several times as many men in its installation. Also there is no doubt that it will prove more injurious to trolley wheels than did the copper wire. Twenty-six miles of steel wire has already and will be installed as rapidly as possible. More of this steel wire is on the way.—Electric Railway Journal.

PETRIE'S LIST
of NEW and USED
MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
1	75	3	25	550	725	Westg.
2	52	3	25	550	720	Lancashire
	50	3	25	550	720	Westg.
1	40	3	25	550	710	Westg.
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	30	2	60	220	720	F.-M.
1	25	3	25	550	1440	J. & M.
1	25	3	25	550	725	Westg.
1	25	3	25	550	720	Lancashire
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
1	20	3	25	550	710	Westg.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	15	3	25	550	710	Chap. & W.
2	10	3	25	550	1400	Lancashire
1	7½	3	25	550	1500	Lang-Dav.
1	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
2	5	3	25	550	750	C. G. E.
4	4	3	25	550	1400	Excelsior
2	3	3	25	550	1500	C. G. E.
4	3	3	25	550	1400	Excelsior

Write Us for Prices

H. W. PETRIE, Limited
Front St. West - Toronto, Ont

GREATER BUYING POWER

That is what the trade paper represents to the man who is a regular and careful reader of it.

In its editorial columns he finds useful ideas that help him in his business—helps and hints that smooth out many of the rough spots—plans the other fellow has tried and found successful.

The advertising pages are also a source of valuable information. Here he learns what the manufacturer has to offer—how those goods are made—the materials that enter into their manufacture—when salesmen are on the road—special opportunities, etc.

He keeps thoroughly posted on the market, because the trade paper is in close touch with the situation and gives him accurate knowledge of conditions—when and what to buy.

Read your trade paper thoroughly each issue and make a reference file of it. You will often have occasion to refer to it.

THE PUBLISHING HOUSE of MACLEAN

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Generation, Transmission and Application of Electricity

Published Semi-Monthly By

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The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for $2.00 per annum. United States and foreign, $2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean, Limited.

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Vol. 28 **Toronto, June 15, 1919** **No. 12**

Placing Returned Technical Men

From time to time we have spoken of the technical clearing houses recently established by the Dominion Government in Toronto and elsewhere and we have ample evidence that the success attending the plan has fully justified those who originally suggested it. That does not mean, however, that all returned technical men are being placed as rapidly as they register and we are advised that at the moment there is a considerably greater supply of technical ability than the demand is absorbing. Employers who can make use of trained men in their business are therefore again urged to consider whether they cannot place one or more of these men at once so that the process of absorption may go on steadily.

It might not be out of place to offer just one little word by way of suggestion to those returned men themselves who appear to have difficulty in securing suitable positions. It is quite true that Canada is in duty bound to see that these men are placed in positions where they can do useful work and live satisfactory lives. On the other hand they must not forget that they are more or less out of touch with civilian and industrial life and must not expect individual employers to place unlimited confidence in their ability until they have to some extent at least, proven themselves. It is entirely reasonable that many of the men that have been overseas for two or three or four years, and have had a wide experience, will very quickly develop into valuable assets to any business, and command good salaries. In the meantime, however, and during the period of trying out is it not reasonable to expect that returned technical men now, just as men had to do before the war, should be satisfied to start in somewhere nearer the bottom of the ladder. The difference will lie in the fact that their training and experience will advance them more rapidly; also in the fact that employers will show every possible consideration to the man who has been overseas.

Canadian Institute of Electrical Engineers

The argument has been advanced by an opponent of the plan of a Canadian Institute of Electrical Engineers that while it is true electrical engineers have many independent interests still there is much in common among all engineers and it is necessary that the whole technical field should show a united front if the general ills of the engineering profession are to be remedied. We believe that is the right idea, entirely—a united front. Let us remember, however, that the work of General Foch in France was no less effective because his armies were not all of one nationality. His success lay in getting these armies to work in synchronism, not in forming them into one great big chaotic mass.

The fault with the E. I. C. organization idea is that it embodies the "mass formation" idea. On the other hand, and as a substitute for this, the Canadian Institute of Electrical Engineers, the Mining Institute, the Society of Mechanical Engineers, etc., propose independence of action except in matters of general interest, which matters may be handled by a common council composed of representatives of all the engineering sections.

What stronger combination of forces could one wish than an engineering council composed of representatives elected by each of several national organizations. It is the modern method of organization—just as applicable in this case as in the management of any business large enough to subdivide into departments. And unless the engineering organizations are operated on a business basis there is little chance that the status of the engineer will be much different ten years hence from what it is to-day.

Closer Co-operation

Evidence that at least two of the sections of the electrical industry are getting into closer working relationship is given by the appointment just announced, of a common secretary to the two organizations—the Canadian Associated Manufacturers of Electrical Supplies and the Canadian Electrical Jobbers' Association. This is a step in the right direction but only the first step. The fact we have all got to come to a realization of is that the success of our industry lies in the development of the field that **consumes** electrical devices and electrical current. The demand for both must be many times increased. Since these items are interdependent, it follows that much good could result from a closer relationship between the manufacturers, jobbers, engineers and central stations; and since, further, the throat of the funnel, so to speak, through which electrical appliances flow to the public is the contractor-dealer, it also follows that he must be drawn closer into the family circle.

Mr. Andrew, the new secretary, is very favorably known to every one of the sections of the industry mentioned above and is, therefore, in a splendid position to take advantage of what appears to us to be a most timely opportunity to get all the wheels moving in the same direction. It isn't an easy task, or one that can be accomplished in a day, but we believe it is possible. We also have such confidence in Mr. Andrew as to believe that if he makes this his aim he will accomplish his purpose. The entire industry humming in synchronism should be the goal towards which we are all striving.

Two Big Electrical Conventions

Canadian Electrical Association — Alexandria Bay, June 27th and 28th

The annual convention of the Canadian Electrical Association will be held this year on June 27-28. The meeting place is Alexandria Bay, Thousand Islands, so that the members will be able to combine a delightful outing with two days profitable business.

The program will consist largely of presentation of reports of committees which have been such a valuable feature in past years. The following committees will report: Overhead Lines Committee; Commercial Light and Power Sales; Rate Research; Prime movers; Electrical Apparatus. Two or three special papers will also be presented, one of which, by Mr. Ernest P. Fredericks, will deal with the "Service at Cost" question.

The boat will leave Toronto on Wednesday afternoon at 3.30, and Montreal Wednesday afternoon at 1.00; return on Sunday. Special rates to convention delegates have been arranged. Further particulars may be obtained from the secretary, Mr. Wm. Volkman, Toronto Electric Light Company, 10 Adelaide Street East, Toronto.

Mr. A. Monro Grier, K.C., President Canadian Electrical Association

Mr. O. H. Scott, President Association of Municipal Electrical Engineers

Association of Municipal Electrical Engineers —Niagara Falls, June 19th, 20th and 21st

The programs have been distributed for the semi-annual convention of the Association of Municipal Electrical Engineers which will be held at the Clifton Hotel, Niagara Falls, Ont., on June 19, 20 and 21. The program includes two interesting papers: "Routine Handling of Customers' Accounts," by R. C. McCollum and "Overhead Distribution Systems," by C. E. Schwenger. A. Monro Grier, K.C., will be the speaker at the convention dinner on Thursday evening and W. L. Goodwin and Samuel A. Chase will occupy the morning session on Friday. Saturday morning will be given over to an inspection trip of the Chippewa Development work which is steadily going forward.

A number of amendments to the Constitution and Bylaws of the association will be considered, one of which provides for a change of name to the "Association of Municipal Electrical Utilities."

Further information may be obtained from the secretary of the association, Mr. S. R. A. Clement, Ontario Hydro offices, University Avenue, Toronto.

Steam-Electric Plant of the Dominion Power and Transmission Company, Hamilton

III.—Electrical Generators and Auxiliary Equipment

Alternating Current Turbo-generator

The turbines, described in our last issue, drive 12,500 kv.a. Westinghouse generators, 6,600 volts, 3 phase, 66 2/3 cycle, 4 poles, 2,000 r.p.m.

The generators are revolving field type, direct connected to steam turbine, with end bells removable to allow access to windings. Field coils are wound with copper strap in slots cut in field core; insulating material subject to temperature of 150 deg. C. without injury. Armature core is built of laminated steel, in cast iron frame and held firmly in place between two end plates. The winding is insulated with material subject to temperature of 90 deg. C. without injury.

The generators are cooled and air treated by special generator humidifiers, two humidfiers to each three generators. Humidifiers were built to the following specifications by the Carrier Air Conditioning Company.

Cross section of casings 13 ft. 8 in. in width, 13 ft. 1½ in. high and 10 ft. 0 in. in length, casing of No. 18 gauge galvanized iron, braced with 1½ x 1½ angles. Inspection door is in side of humidifier for inspection and cleaning, with glass panels. Settling tanks 18 in. high of No. 16 gauge galvanized iron, braced with 1½ x 1½ in. angles. Suction strainer in one end of each tank of 20 mesh copper wire cloth; top of suction chamber covered with galvanized iron door to keep out dirt; strainer prevents dirt and foreign matter getting into spray nozzles. Spray nozzles give finely atomized spray completely filling spray chamber; are of brass, set so as to discharge against direction of flow of air, and placed 3 ft. in front of eliminator plates. The eliminators are vertical galvanized iron plates with parallel surfaces, spaced uniformly in rows, and bent to small angle so that adjacent plates form continuous sinuous passageway through which air passes; plates are mounted on galvanized angle iron framework, supported from bottom of settling tank; joint between eliminator frame and spray chamber is water tight. Pumps are centrifugal with direct motor drive.

Portion 6600 volt switch room

The first four corrugations of the eliminator plates act as a washing surface. These eliminators are spaced so that air is broken up into small, thin layers, making all particles of dust come in contact with wet surface of eliminators. Special means is provided by an independent set of flooding nozzles for maintaining a constant sheet of water flowing down the wet surfaces continually; a valve is provided for closing off the spray nozzles in very humid weather and washing procured by flooded eliminators.

West side 6600 volt bus structure

Each washer includes the following: number of spray nozzles, 560; number of flooding nozzles, 54; spacing of eliminators, 1⅛ in.; area suction strainer per ft. width, 1 sq. ft.; gals. water per minute, 367; size of motor, (3 phase, 550 v.66-2/3 cy.) 15 h.p.; velocity of air through washer per minute, 500 ft.; normal cap. of each washer per minute, 78,000 cu. ft; overload cap. of each washer per min. 109,000 cu. ft.; washing surface exclusive of eliminator surface, 1,440 sq. ft.

Each washer is provided with marine light with switch outside.

The current from the generators is carried by twelve 500,000 c.m. lead covered cables to the controlling breakers in the switch room. Each generator is separately excited by a motor driven exciter.

The normal full rating of each exciter generator based on the specified full load voltage is 75 k.w., 125 volts, 600 amps. full load, 4 poles, 1280 r.p.m.; shunt interpolar winding. The generator is driven by a Canadian Westinghouse induction motor, 112 h.p., 550 volts, 3 phase, 6 poles, 1333 r.p.m. at no load; 1280 r.p.m. full load.

A steam driven exciter is also available for either machine in case of necessity.

The turbine is horizontal type impulse adapted for driv-

[illegible] 75 kw., d.c. generator. Gauge pressure at throttle is 200 lbs. superheated steam; back pressure of 0 lbs. vacuum in exhaust pipe referred to bar. pres. of 30 in. Superheated at throttle 160 deg. F. r.p.m. 2750. The turbine blades are made of nickel iron.

The current, generated at 6600 volts, is transformed to 42,000 volts by three 4,000 kv.a. transformers, delta connected to each machine.

The normal full load rating of these transformers is based on the following specified phase, cycles and voltages: 4000 kv.a., shell type, single phase, 66.6 cy., 41,000/13,200/6,600 volts. The transformers are designed for operation in oil; the cooling is effected by means of water circulated through cooling coils placed beneath surface of oil.

Windings are of shell type, both high and low tension divided into many flat coils and the layers separated from each other by insulating sleeves covering the conductors. The coils are individually insulated and assembled into groups with strong insulating barriers between them.

The machines, together with the transformers, are considered a unit and are tied together only on the 42,000 volt side, thus introducing two banks of transformers between machines in the event of trouble in one of them. Two transmission lines pass through the roof of the building and carry the output to the switching station (outdoor type at Bartonville.)

All electrical apparatus is remote controlled from the operating room.

The plant is housed in a modern brick and steel fireproof building of pleasing appearance; the building is equipped with every convenience for the operating staff. The engine room is finished in white enamel, satin brick walls, buff gypsum ceiling and red quarry tile floor, and is served by an electric crane. The remainder of the plant, excepting the office and control room is finished with red pressed brick, concrete floors and buff gypsum roof. The steel throughout is painted grey and the combination presents a neat and business-like appearance.

42,000 volt switch and bus room

The larger rooms are effectively illuminated by nitrogen lamps properly contained, hung from the roof trusses.

The 50-ton power-house crane (Cleveland Crane & Engine Co.) is also electrically operated. The maximum working load of the main hoist is 50 net tons and of the auxiliary hoist 5 net tons. Each hoist will carry 25 per cent. overload. From centre to centre of runway rails is 53 ft. 4 in. Maximum lift of hook is: main 40 ft. 0 in., aux. 50 ft. 0 in.

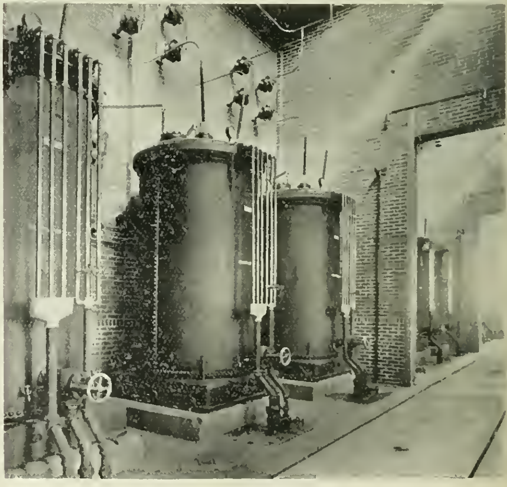
Operating and control room

Speeds are as follows:

	Full load	No load.
Main hoist	5 f.p.m.	10 f.p.m.
Aux.	20 f.p.m.	40 f.p.m.
Bridge travel	150 f.p.m.	200 f.p.m.
Trolley	75 f.p.m.	100 f.p.m.

Motors are Westinghouse, 125 volts, of following sizes: main hoist, 25 h.p.; auxiliary, 10 h.p.; bridge travel, 25 h.p.; trolley, 10 h.p.

The brakes are foot operated from cage with mechanical brakes of double friction, band type self-lubricating running submerged in oil. Each hoist has automatic electric brake of post type attached to armature shaft of hoist motor and operated by a solenoid; is connected to apply itself on failure of



Transformer pockets

current. It is equally effective in stopping motor when hoisting or lowering, and is capable of sustaining full load of hoist.

Each hoist is provided with auto circuit breaker that breaks circuit when hook is raised above or descends below, predetermined point; is of cage operated type. The hoisting rope is of special crucible steel 6 x 37 construction. Trolley is 3/0 bars.

From the switching station a single 45,000 volt circuit passes out to Burlington, a double circuit to Brantford, three circuits to Power Glen (near St. Catharines) and two circuits to a number of transforming stations which serve the industrial needs of the city of Hamilton. (Power Glen, it will be remembered, is the location of the De Cew Falls hydro-electric development of the company which is tied in with the steam plant.) 13,000 volt lines also supply power to Welland, Port Colborne, Thorold, St. Catharines, Beamsville, Grimsby, Oakville, Dundas and other towns in the district.

The electric railway system of the company which has its centre at the Terminal Building, Hamilton, where the offices of the company are located, gives an excellent interurban service to Brantford, Dundas, Oakville and Beamsville, in addition to the local system.

The steam electric plant, the complete description of which is completed in this, the third article of the series, was designed and built by the company's own organization. Mr. W. C. Hawkins is managing director and Mr. E. P. Coleman, general manager; Mr. W. G. Angus, superintendent of operation; Mr. Waller, superintendent of railways; Mr. L. W. Pratt, manager of light and power sales; Mr. George Service is mechanical engineer at the plant and Mr. Chas. H. Hutton, electrical engineer in charge of operation.

American Engineering Standards Committee

In many lines of engineering much excellent standardization work had been done before the war; the war emphasized its importance and showed most clearly the need of co-operation to prevent the confusion caused by the promulgation of overlapping standards by independent bodies. During the war the Government departments co-ordinated these efforts in certain lines and greatly assisted in unifying them. The American Engineering Standards Committee representing the American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, and American Society for Testing Materials, together with representatives of the U. S. Government Departments of War, Navy and Commerce, has just completed and adopted a revision of its constitution which has been sent to the Governing Boards of all the departments and societies represented on the committee with a request for its ratification. The new constitution changes the name to American Engineering Standards Association, the change from "Committee" to "Association" more fittingly indicating the wide scope of the interests involved.

The objects of the Association are stated as follows:

1. To unify and simplify the methods of arriving at engineering standards, to secure co-operation between various organizations and to prevent duplication of standardization work;

2. To promulgate rules for the development and adoption of standards;

3. To revise and pass upon recommendations for standards submitted as provided in the Rules of Procedure, but not to initiate, define or develop the details of any particular standard;

5. To give an international status to approved American engineering standards;

6. To co-operate with similar organizations in other countries and to promote international standardization.

Means are provided for increasing the number of representatives in the Association by invitation or on request. Several important organizations interested in standardization will be invited to appoint representatives as soon as the necessary power is obtained.

New Rail Route to Western Canada

Travellers between Eastern and Western Canada are showing their appreciation of the high standard of railway service afforded by "The National," the splendid train which operates between Toronto and Winnipeg. "The National" uses the rails of the Grand Trunk to North Bay, the Temiskaming and Northern Ontario (Provincial Government Line) to Cochrane, and the Canadian National Railways to Winnipeg, where it links up with the Grand Trunk Pacific for all important points in Western Canada. A pleasant run to Toronto by the Grand Trunk and "The National" is ready to carry you westward. The departure of "The National" from Toronto is at 9.15 p.m. on Tuesdays, Thursdays and Saturdays. North Bay is reached early next morning and there opens up for your admiration all the lakeland beauties of the territory served by the T. & N. O. Line, while the rich Cobalt and Porcupine districts may be inspected. These are followed by a wonderfully interesting trip through the sparsely populated territory of New Ontario, giving the traveller an opportunity of inspecting this fertile region, including the famed "clay belt," where tens of thousands of settlers will make their homes in the future. The area of New Ontario is 330,000 square miles, fully four times the size of Old Ontario, and in addition to great expanses of good farming land, it has wonderful resources in timber, minerals, water power, fish and game.

The three railways have combined to make the through passenger service over this new route the equal of that offered anywhere on the continent. The smooth, straight and level roadbed embodies all that has been learned in three-quarters of a century of railroad building. The greatest travel comfort is assured. The use of the new route involves no extra fare, as compared with any other route available, between points in Eastern and Western Canada.

It is stated that the Ontario Hydro-electric Power Commission have purchased from James Battle his electrical plant and transformer equipment at Thorold for $100,000. Mr. Battle held a 26 year contract with the Ontario Power Company and supplied a number of industries and private consumers in and around Thorold.

The Administrative Commissioners of Montreal have renewed, for a period of ten years, the franchise of the Southern Counties Railway. The city will get an increased price for the privilege, at the rate of $1,400 per mile per annum, while the company will also have to bear the cost of removing snow, cleaning and repairing the streets, this being estimated at $4,167. The company further agrees to construct underground conduits for its power conductors, if required to do so.

The Toronto Hydro Electric System have distributed their annual report for the year ending December 31, 1918. The net income from operations was $21,667, and the balance carried forward to 1919 is $63,970. The report of the general manager, H. H. Couzens, states that in spite of the discontinuance of the demand for munitions and war supplies, which brought the load on the Toronto System up to approximately 50,000 h.p., the present peak demand is within 3,000 or 4,000 kw. of the demand at the corresponding period a year ago.

Comparison of Central Electric Station Industry in Canada and United States, 1917[*]

From our Ottawa Correspondent

The results of the census of central electric stations taken in the United States for the year 1917 have just been made public, and it is interesting to compare them with the results of the similar census taken in Canada for the same period, and made public some months ago.

In both countries the basis of compilation has been the same. Stations engaged in the sale of electrical energy for light and power are classed as central stations and include both generating and non-generating establishments. Establishments generating electrical energy for their own use not included. As the basis of compilation is similar, the tabulated results may be satisfactorily compared. The comparison in the attached table is based on total and percapita figures. As central station industry is, from its nature, very closely associated with the general public, the per capita figures form a logical and reasonable basis for comparison.

In respect to the total number of stations, it will be noted that Canada has 666, compared with 6,541 in the United States, or 0.080 per thousand population in Canada compared with 0.063 per thousand population in the United States. The proportion of commercial stations is about the same in both countries, while for municipal stations, Canada has the advantage of 0.041 as against 0.022 in the United States.

Referring to the primary power, Canada has a total installed horse power in central stations of 1,844,571 h.p., as against 12,857,998 total horse power installed in the United States, or 221.0 h.p. per thousand population in Canada, as against 124.0 per thousand population in the United States. The analysis of the primary power installation forms, however, the most interesting feature of comparison. Steam power in Canadian stations totals 180,200 h.p., while in the United States it totals 8,389,389 h.p., or on a per capita basis, 21.6 h.p. for Canada, as against 81.0 for the United States. On the other hand, the water-driven installation of central stations in Canada is 1,652,661 h.p., as against 4,251,423 h.p. for the United States, or on a per capita basis 198 h.p. for Canada, compared with 41 for the United States. In other words, 90 per cent of the central station installation in Canada is based upon water power, while only 33 per cent. is so based in the United States.

The advantage possessed by hydro power as the basic power for central station work is strikingly shown by an analysis of the figures in the attached table. The number of persons employed in the central station industry per thousand horse power installed is 4.8 in Canada, as against 8.2 in the United States, or in other words, the average installation in horse power per employee is 2,084 h.p. in Canada, as against 1,217 h.p. in the United States, indicating the lower staff operating costs in hydro stations. The salaries and wages per horse power installed per annum total $4.22 in Canada as against $7.47 in the United States.

While it is possible to compare the income from electrical service in the two countries, the records of the total expenses, exclusive of the salaries and wages, are not available in the Canadian census. It will be noted, however, that while the total income for electric service per capita in Canada is greater than in the United States, it is only $24.14 per horse power installed in Canada, as against $39.05 per horse power installed in the United States. After deducting the salaries and wages, the central stations receive a net income of $19.92 in Canada and $31.58 in the United States (both figures based on primary installation), to provide for the fixed and operating charges apart from staff. Looking at it from the standpoint of the public, it would appear that the power and light users of Canada, after providing for the staff operating charges, are taxed for the remaining annual charges only $19.92, as compared with $31.58 in the United States, on the basis of service rendered, or at least on the basis of primary power installation available for service. Undoubtedly the fuel costs arising from the greater proportion of the fuel driven stations in the United States as compared with the greater proportion of water-driven plants in Canada account largely for these figures.

A further interesting fact in connection with the installation is the size of the primary units in the two countries. In the steam plants the average per unit in Canada is 718 h.p.,

Comparison of Central Electric Station Industry in Canada and the United States, 1917

Item	Total Canada	Total U.S.A.	Per 1000 population Canada	Per 1000 population U.S.A.
Number of Stations	666.0	6,541.0	0.080	0.063
Commercial	323.0	4,224.0	0.039	0.041
Municipal	343.0	2,317.0	0.041	0.022
Income (from Electric Service)	$44,536,848.00	$502,100,408.00	$5,338.00	$4,851.00
Income (from Electric Service) per h.p. installed	$24.14	$39.05	....	....
Number of Persons Employed	8,847.0	105,546.0	1.06	1.02
Number of Persons Employed per 1,000 h.p. installed	4.80	8.21	....	....
Salaries and Wages (Totals)	$7,777,715.00	$95,239,954.00	$932.00	$920.00
Salaries and Wages per h.p. installed	$4.22	$7.47	....	....
Installation:—				
Total Horse Power	1,844,571.0	12,857,998.0	221.0	124.0
Steam Engines, number	251.0	7,464.0	0.031	0.072
Horse Power (Total)	180,200.0	8,389,389.0	21.6	81.0
Horse Power (Average per Unit)	718.0	1,124.0	....	....
Gas and Oil Engines, Number	113.0	2,946.0	0.013	0.028
Horse Power (Total)	11,710.0	217,186.0	1.4	2.1
Horse Power (Average per Unit)	104.0	74.0	....	....
Water Wheels, Number	619.0	3,357.0	0.074	0.032
Horse Power (Total)	1,652,661.0	4,251,423.0	198.0	41.0
Horse Power (Average per Unit)	2,670.0	1,266.0	....	....
Average Installation in h.p. per Employee	2,084.0	1,217.0	....	....
Average Capacity of Stations in h.p.	2,770.0	1,965.0	....	....

Table based on estimated population in 1917,—Canada 8,343,000; United States 103,500,000; and on census of Central Electric Stations industry taken in both countries in 1917.

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[*] Based on a census of central electric stations taken in Canada by the Dominion Bureau of Statistics in co-operation with the Dominion Water Power Branch, and in the United States by Bureau of Census, for the year 1917.

as compared with 1,124 h.p. in the United States. In Canada the average water-wheel unit is 2,670 h.p., as compared with 1,266 h.p. in the States. These differences are logical considering the trend of the central station installation towards steam and water in the respective countries. The average capacity of the Canadian station is 2,770 h.p., as compared with 1,965 in the States. Other interesting ratios and comparisons may be drawn from the figures in the table.

It has been stated that Canada possesses a peculiar advantage in respect to its water power endowment in that practically every commercial and industrial centre is within easy transmission distance of and is already served with ample supplies of economically developed hydro-electric power. That this unique advantage has been appreciated in principle and is being realized in practice is strikingly shown by the above figures which indicate the extent to which the water resources of the Dominion are being adapted to the production of electrical energy, and the substantial benefits accruing to the public therefrom.

Power Factor Correction and Voltage Regulation

Obtained with Two Water Wheel Type Generators Used as Synchronous Condensers by the City of Sherbrooke Gas and Electricity Department

By C. J. Desbaillets*

Early in the year 1918 the corporation of Sherbrooke was asked for an additional thousand horsepower by the munition factories. It was impossible to deliver this power due to the fact that on both power houses of the corporation the load had a power factor of less than 60 per cent. On account of this very low power factor the generators were overloaded to the limit of their kv.a. capacity ,although the actual load in kw. was considerably below what could be obtained from the turbines.

Following are the characteristics of the two plants of the corporation and their load carried early in the year nineteen hundred and eighteen:

Rock Forest Plant

The Rock Forest plant is situated six miles from Sherbrooke. This plant consists of two 930 kw. generators connected to two 1,470 h.p. Morgan Smith turbines. The maximum load carried by this plant, previous to the change, was 1,700 kw. on the two machines, at a power-factor of sixty per cent. with an armature current of 124 amperes per machine, whereas the full load amperes at eighty-five per cent. power-factor was only ninety-seven.

The output of the turbines was thus only 2,260 h.p., and 420 h.p. were lost, as the two turbines were capable of delivering 2,680 electrical h.p. on the generator.

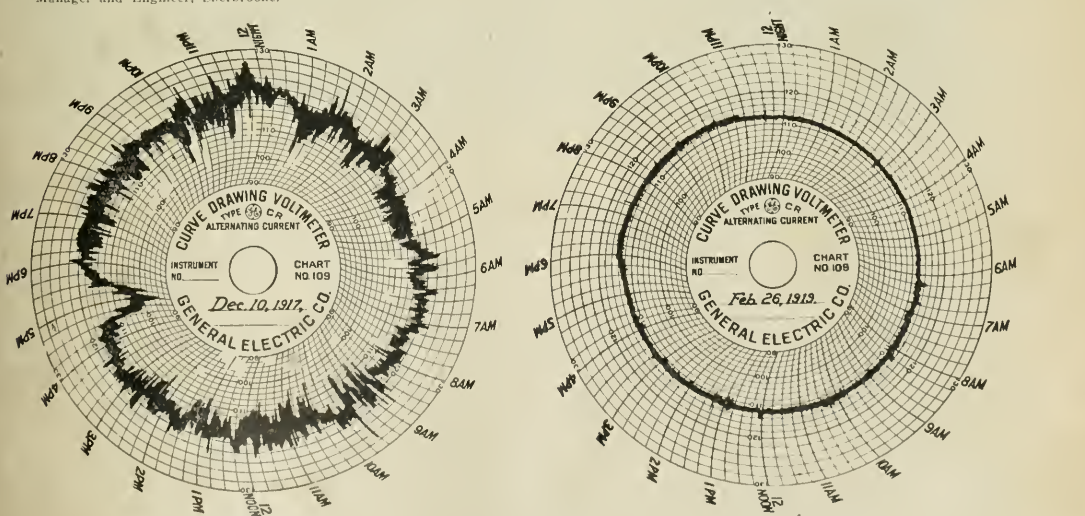
City Plant

This plant is located in the city of Sherbrooke, and consists of two 850 kw. generators at 85 per cent power-factor, connected to two 1,300 h.p. Boving wheels. The maximum load carried by this plant early in the year 1918 was 1,560 kw. on the two machines, with a power-factor of sixty per cent. and an armature current of 320 amperes ,whereas the full load current was only 250 amperes. The output of the turbines was then only 2,150 h.p., and 450 h.p. were lost, as the two turbines were capable of delivering 2,600 h.p. to the generators.

It is evident, from the above figures, that the only remedy to the situation was the raising of the power-factor. The corporation had at its disposal two 625 kw. water wheel type generators, 225 r.p.m.; and it was decided to operate these generators as synchronous condensers.

After careful study, these machines were located in the distributing station, four thousand feet from the Frontenac Street power house, and they were started from rest by separating the feeder line from the Frontenac Street plant to the distributing station in two circuits; and thus, by using one generator of the Frontenac Street plant, the two synchronous motors were successfully started at the sub-station in the following manner.

One of the generators at the Frontenac Street plant is stopped, and full field of 250 amperes is applied; at the same time, at the end of the starting line at the distributing station, the synchronous motor switch is closed, and fifty amperes field current is applied. After signalling to the power house that everything is ready, the generator attendant slowly opens the gates of the turbine, and both machines are



Before and After—Showing the effect of the synchronous condensers on the voltage of the bus-bars brought up to speed in synchronism. The generator in the Frontenac Street plant is synchronised to the bus with its synchronous condenser at the same time. The synchronous motor bus switch is then closed at the distributing station, thus connecting this synchronous motor on the sub-station bus bar, which is already in parallel with the Frontenac Street plant bus bar. The starting line is opened at the synchronous motor, and this machine is then floating on the bus bar of the distributing station.

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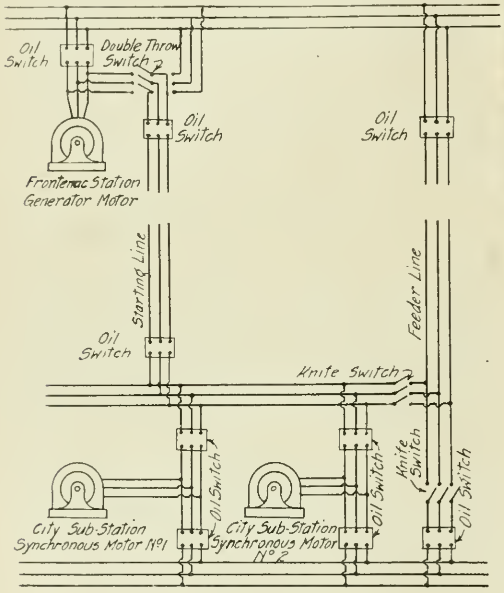
*Manager and Engineer, Sherbrooke.

The same performance applies to the starting of the second synchronous motor.

As you can see by the wiring diagram the starting line can be connected in parallel with the feeder line as soon as the two motors are started, and will make this line sufficient to carry the load of the two generators of the Frontenac Street plant.



Wiring diagram for synchronous motors

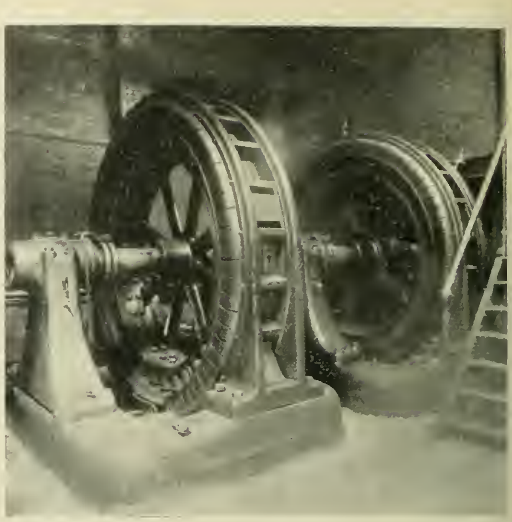
It is to be noted that no additional copper was required for this starting line as when one of the generators is used to start the synchronous motor, the other machine can only deliver half of the plant capacity; therefore half the feeder line section is sufficient for the purpose.

The characteristics of these motors have been such that they have successfully kept in step in spite of various short circuits and grounds which have occurred during the year, and only one shut down was experienced during twelve months of operation.

Voltage Regulation

The Tirrill regulator which was used in connection with the generators had not given satisfaction, as the whole system was subject to heavy fluctuation due to a couple of steel furnaces operated by the Canadian Brakeshoe Company; and it was found almost impossible to keep the regulator in operation during the breaking of the charge on these steel furnaces.

This Tirrill regulator was then removed and installed in connection with the motor-generator set exciter at this distributing station and installing of the switching apparatus excitation for the synchronous motors.



Showing the two synchronous motors in operation

The series element of this regulator is connected to the steel furnace circuit, and the regulator is acting upon the synchronous motor exciter and is maintaining a constant voltage by varying the power-factor on the bus-bars. The two voltage charts will show what the voltage was before the change and after.

Horse Power Recovered

After the above mentioned change was made, the Frontenac Street power house was in position to deliver 1,940 kw. at eighty-eight per cent. power-factor with 300 amperes on the machine; and the Rock Forest plant has carried 2,120 kw. at ninety per cent. power-factor with 90 amperes per machine. This means that during nine months of the year 1918 the corporation was in position to sell a one thousand h.p. demand by the manufacturers of shells, without adding any machinery to their power houses, but simply by making use of two old generators, at an expense of approximately $2,000 covering the removing of these machines to the distributing station and installing o fthe switching apparatus for the starting of same.

It may be interesting to know that prices were asked from the manufacturers to make these machines self-starting; this change would have cost in the neighborhood of $7,000.00. Moreover, the starting of these machines, as described above, is done without any trouble or disturbance on the line.

Personal

Mr. S. L. B. Lines, manager Chamberlain & Hookham Meter Company, Toronto, has returned from a business trip to England.

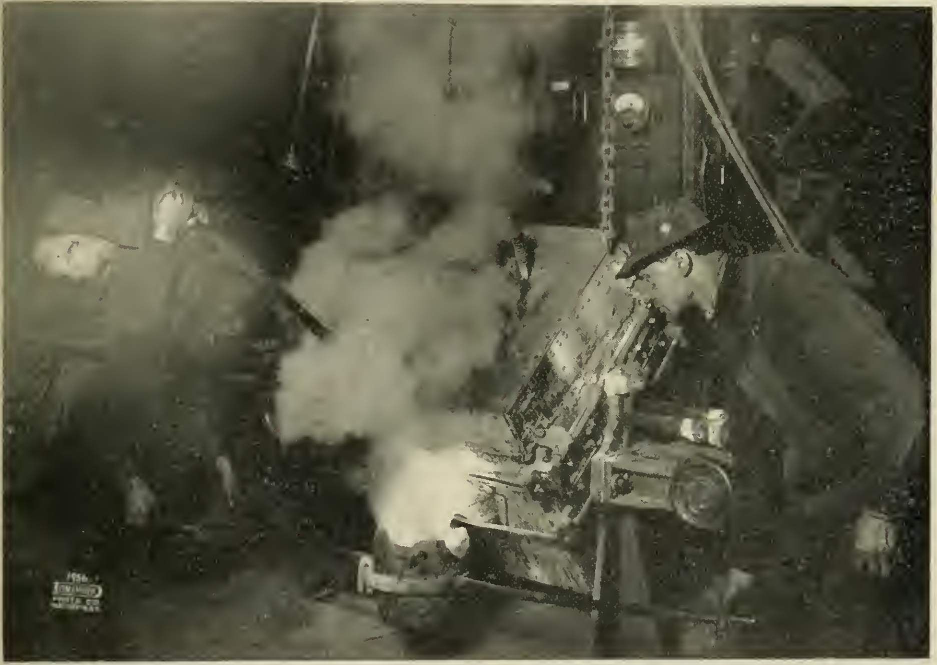
Flight-Lieut. Rupert Davidson, of Cobourg, Ont., has accepted a position as electrical engineer on power development on the Para River, Brazil.

Mr. W. M. Andrew, of the Toronto office of the Canadian Westinghouse Company, has been appointed secretary of the recently formed associations of electrical manufacturers and electrical jobbers.

Mr. J. J. Ashworth, assistant general manager Canadian General Electric Company, has been elected a director of the company. Mr. A. E. Dyment has been elected vice president.

Electric Furnace for Melting Brass

There has been operating in the foundry of Messrs. Letson and Burpee, of Vancouver, for the past five months, the first electric furnace for melting brass ever installed in British Columbia. It is the invention of Mr. J. D. Shipton, a well-known electrical engineer in the terminal city, and has been eminently successful in its work. In an iron foundry where dirt and steam are everywhere, the simplicity of the furnace is what appeals to a foundry man. It is operated with the greatest facility and no real skill is required to handle it. An ordinary workman can be taught in a few hours to look after it.



Electric smelting furnace for melting brass—Vancouver, B.C.

Its capacity is 500 lbs. in four hours from a cold furnace, and the consumption of electrical energy is 440 kw.h. to the ton; in a one-ton furnace it is 250 kw.h. The power-factor averages about 83 per cent., with good carbons. Consumption is about 10 lbs. to the ton. Its efficiency is shown up better on ten-hour service and on a 24-hour operation it is, naturally, still better. On account of its load-factor the cheapest possible rate can be secured from a power company for the current.

While this furnace is designed to melt 500 lbs. in four hours, it can be designed to melt this same charge in two hours. In fact there is practically no limit to the speed of melting, though at the same time it is not an advantage to so crowd the melting that the heat from the arcs cannot be absorbed by the metal fast enough without the upper portion nearest the arc is at a vaporizing temperature.

With this furnace, as high as 35 per cent. zinc has been melted, showing practically no loss of zinc, only at the moment of pouring. Naturally some zinc is absorbed by the lining after the furnace has been re-lined, more especially if the lining has not been well burned before using. But this loss is very small. The design of the furnace is such that it will hold one thousand pounds of metal, which means that the hearth can hold about 1,400 lbs., still keeping the metal at a safe distance from the arc.

In charging, about 600 lbs. are put in the hearth by the feed door and 400 lbs. are put on the pre-heating shelf which is fed from the two openings in the top of the furnace. Those openings are then closed and the current switched on, and by the time the hearth portion has reached a temperature of about 1,500 degrees Fahr., that metal in the pre-heating chamber has reached a temperature of from 700 to 800 degrees Fahr. This is then dumped into the hearth and, in a few minutes, has reached its pouring temperature. Among foundry men there is no instance known where the pouring temperature has been greater than 1,650 degrees, and sometimes it is as low as 1,400 degrees Fahr.

It will be interesting to note the difference in these pouring temperatures and the temperatures mentioned in the pamphlet published by the United States Bureau of Mines last year. Mr. Shipton claims that it is not necessary to raise the temperature higher than the figure stated.

Eighty-five per cent. copper has been successfully melted and 15 per cent. zinc, and as low as 60 per cent. copper and 40 per cent. zinc, both ingot and scrap in all forms. The advantages of the pre-heater are greater efficiency, preservation of the top and no delays by having to add cold charges to the melted charge, thereby causing partial freezing which holds up the melting operation considerably.

In brief, the Shipton furnace has the following points which should appeal to everyone engaged in this class of work—the hearth is rectangular in design and it is therefore a simple matter for a laborer in the foundry to re-line same; its choke coil regulator being of rugged construction, the only knowledge required to operate same is to turn a wheel one way or the other, thus regulating the voltage from 40 to 110; dust, dirt or steam does not prevent successful operation; no skilled labor is required to operate the furnace, the furnace tilts to pour its charge, this method having been found to give the most satisfaction in preference to tapping.

The only renewals needed each month is a cylindrical refractory sleeve used on the carbons where they enter the furnace walls, whose inner diameter corresponds with the diameter of the carbons used. One of the greatest advantages of the Shipton furnace is that it can be manufactured and sold for about one-half the price of any other electric brass melting furnace on the market.

Calculating the thermal efficiency of the one-ton furnace at 180 kw.h. as the theoretical heat required, or 154,800 calories, it will show a thermal efficiency of 72 per cent., which it must be admitted is very good indeed.

Electrical Equipment on the All-Metal Cars of the Manchester-Bury Electrical Section, Lancashire and Yorkshire Railway

By George Hughes, M. Inst. C. E.

When new motive power is required, the railway engineer has to consider the following points:—Geographical position, gradients, junctions, density of traffic, difficulties of operation, possible range of user, and future developments. The paper is arranged in the order as appertains in the passage of current:—

A shoe collects current from a side-contact live rail, the shoe pressure being 25 lbs. This shoe, fixed to the bogie, is connected to the trolly cables, from which connections are taken through the various parts of the equipment to the motors. A connection is taken to a rotary transformer, which supplies low-tension 100-volt current for operating the control equipment.

The trolley cables have been housed in Jarrah wood, as this material has been found the most satisfactory.

The electrical connecting of coaches is accomplished by "plug and socket" type couplers; the high tension (1,200-volt) is connected to the trolley cable, and the low tension (100-volt) to the rotary transformer; also a control coupler is connected to the multicore cable for the contactors.

The 1,200-volt portion of the equipment is placed in a high-tension compartment, completely isolated from the remainder of the car, the door of this compartment being interlocked with the main switch, which is of the single-blade type.

The rotary transformer is a 10-kilowatt machine; it has two windings on the armature, and is operated on the high-tension side by an automatic control-switch, which is necessary owing to the gaps in the live rail.

The electrical control equipment is of the shunt multiple-unit type, arranged for automatic or manual operation in the forward position, and manual only in the reverse. Field control is also provided for.

The automatic control is operated by means of relays governed by the main motor current. Succeeding contactors cannot operate until the motor current has fallen to a predetermined value, and the sequence of operation is controlled by electrical interlocks.

The controller has nine positions of the handle, the last being for supplementary field control, and there are four positions of the reversing handle.

The main circuit-breaker is of the magnetic shield type, and can be tripped or re-set from the motorman's compartment.

The contactors are made up in two groups, one group at each end of the car, and controlling two motors. Each single contactor is fitted with a magnetic blow-out coil and two arcing horns protected by soapstone shields.

The motor cut-out is manually operated, and when in the normal position two motors are in circuit; if moved in either direction one or other of the motors is cut out.

Each reverser controls two motors, and is solenoid operated from the master controller.

In the motor-bogie the best locomotive practice has been adopted, and the design is the outcome of the development of the built-up frame bogie. The gear wheels are pressed on to the axle and bolted to the wheel centre. They are of mild steel, with involute teeth, No. 2 diametral pitch, and the load is taken uniformly on two teeth throughout the arc of action. The road wheels are of the standard locomotive-spoked type, and the tyres are made of Siemens-Martin steel of locomotive pattern but 5 inches wide, and are shrunk on to the wheel centres. The wheel centres are steel castings made by the Tropenas process. The bolster is of the box-girder form, with a lateral movement of 1½ inch each way. A double-brake block arrangement is fitted, and the average life of a brake block is about 5,700 stops, excluding signal checks and coasting on down grades. Each bogie is fitted with two motors geared to the axle through spur gearing, the ratio being 2.36 to 1.00.

Nose suspension of the motors is adopted, half the weight being spring-borne, and the other half resting directly on to the axle.

The motors are 200 horse-power, and have been designed on the experience gained on the Liverpool and Southport line. Solid field frames have been used, also increased ventilation provided for, and interpoles fitted. The field and interpole are vacuum impregnated and enclosed in brass cases. The temperature rise of these motors is 55 degrees Centrigrade after a one-hour's run at full load. The quality of steel for field frames was investigated, and it was proved that a mechanically stronger casting could be manufactured with only a very slight reduction in permeability, and a B.H. curve is shown of two different qualities of steel, also a characteristic curve of the motor.

The vacuum-brake equipment is of the simplest possible form, and its leading features are the installation of a pump capable of releasing the brake in 12 seconds, and a brake valve which admits air to the train pipe, and also starts and stops the pumps. A separate vacuum reservoir is provided for operating the horn in case the current is cut off for a short time. In the design of the brake-valve the "dead-man's" handle is incorporated, which applies the brakes and cuts off current to the main motors.

The vacuum-pump has forced lubrication. Inlet and outlet valves are fitted in the cylinder heads, and these can be easily and quickly removed. The motors, of 5 h.p., for driving the pumps are series wound, and running at 1,000 revolutions per minute on a 100-volt circuit. This pump is operated through a switch in the brake-valve and an automatic regulator.

Below the brake-valve is a tripping-switch, which breaks the master-controller circuit when the "dead-man's handle" comes into operation, or when the motorman uses a special key for converting the brake-valve into an ordinary van valve.

Bell code signals between guard and motorman are supplied with current from a small battery of accumulators; the latter are also used for emergency lighting.

The lighting of the cars is taken from the 100-volt circuit, and the heating from the 1,200-volt circuit.

The Contractor-Dealer

Vancouver Contractor-Dealers Stage a Big Convention—Officials of B.C.E.R. and Western Power Companies and Representatives of Canadian Manufacturers and Jobbers Lend Their Assistance

[The following pages contain a report of the recent convention of the British Columbia Association of Electrical Contractors and Dealers. Regarding Mr. Goodwin and Mr. Chase, this means a certain amount of unavoidable repetition of material already published. However, these gentlemen are always saying something new or saying the old thing in a new way, so that, while an explanation may be in order, an apology is not. The whole proceedings will be found to contain valuable information for all our readers.—Editor].

The third convention under the auspices of the Vancouver Association of Electrical Contractors and Dealers was held in the Hotel Vancouver of the Terminal City on May 26th and 27th and was considered by the promoters the most successful that has ever taken place in connection with this organization which now includes in its ranks practically every electrical contractor and dealer in the city of Vancouver. There were nearly one hundred delegates registered and the proceedings throughout the two days were of a most practical character. Mr. E. Brettell, president of the association, presided and with him at the table were Mr. W. L. Goodwin and Mr. Samuel Adams Chase, both well-known figures in the industry.

The task of welcoming the delegates and visitors fell to Mr. William McNeill, assistant general manager of the Western Power Company of Canada, and no more suitable selection could have been made. Mr. McNeill who was in his happiest vein prefaced his remarks by stating that if the physical atmosphere was cool their hearts were warm. They had, he said, waited long and patiently for this convention and he thought the thanks of those present were due to the committee who organized it and who had prepared such a splendid programme for their edification.

Unrest in World Today

"I suppose we all realize," said Mr. McNeill, "that at a time like this it is difficult to say almost anything. There is so much unrest in the world today that perhaps most of us feel that the better part of wisdom is to say as little as possible and to do a correspondingly greater amount. But **I do trust that the result of this convention will be to bring us together in such a way that co-operation will take a far greater place in the annals of our business life than this fierce unrestricted wasteful competition has done and that the result of our gathering together will be to produce a better relationship and greater harmony between employer and employee and between employer and employer, so that, perhaps this wasteful competition in some measure at least may be eliminated and a better and greater degree of co-operation may begin.**

"I am sure we here today believe that we are fit for the tasks that lie ahead of us, realize that there is dissatisfaction at the unrest that prevails, believe that surely there must be some way out, and it is the business of a convention such as this to try if possible and find out such a way. We have found for example that the old world as it existed in prewar days was not good enough for us to live in and surely this lesson is also becoming self-evident that it is not enough for us simply to try and restore things to the old condition of affairs. If we do that, changes are bound to come that will be for the worse. We must do more than restore. We must build and we must rebuild so that in this reconstruction period which we have entered on there will be greater results and a greater degree of co-operation than has hitherto been seen.

"Fundamentally it is not enough for the cure of the ills that beset the industrial world today to simply grant larger wages and shorter hours, much as these things are to be desired. There must somehow be introduced a new relationship that will take the place of the present system, perhaps of collective bargaining and of the strike both sympathetic and local and that this relationship will tend to do away with the fierce and awful conflicts that have hitherto characterized labor and capital in the past. Over a century ago from the fierce fires of the French revolution there emerged the golden motto which I, at least, believe contains the secret of the world's hope and the world's deliverance. The motto was—"Liberty, Equality and Fraternity." Change those terms into more up-to-date ones and you have—"Freedom, Democracy and Co-operation" and, surely in that triple tie there will be found the banding together that will relieve and perhaps dispel some of the great conflicts that we are going through."

Present Time of Real Significance

"I do trust," Mr. McNeill continued, "that our coming together at such an opportune time as this is of real significance to this city and to this country. I would wish even for a wider significance to your deliberations as they progress. And I trust that things will be done here and accomplished that will tend to promote freedom, democracy and co-operation in the highest form. Remember that those things cannot be accomplished unless by that word "sacrifice" on all sides to this question. But surely what we have seen in the last four years will give us hope. If our men went through four years of hell for these important things for which they fought, and so many have died, and others, as we see, are maimed—surely with the bigger things settled, these other matters pertaining to labor and capital and employer and employee, however big the are—this greater thing, the freedom of the world, the democracy of the world and the fraternity of the world as we see it among the great nations today can also be settled too."

"So that I am delighted," he concluded, "to find at this particular time so many of you attending this convention today. I trust that your deliberations will be fraught with the highest and the best possibilities for the good of our country and I believe with the opening of this convention there will be spread abroad in our hearts and minds a feeling of co-operation and fraternity that will produce good results and that co-operation will be the keynote of this convention."

A glimpse of what is being done in eastern Canada in the matter of organization was given by Mr. F. Jno. Bell, general manager Canada Wire and Cable Company, Toronto representing the Manufacturers' Association of that city. Their association had, he said, been formed for mutual benefit and also with the idea of getting together with other sections of the industry, particularly in view of the general misunderstandings that had obtained in the country and between the east and west. One point he laid emphasis on in their constitution was that there was nothing to restrain a firm or any member of the association at any time getting such prices and terms as he pleased and each member could compete for business as he wished as if the association did not exist.

On behalf of his association he extended hearty greetings to the Vancouver organization and trusted the day was not far distant when all their associations might be united to bring about a better condition in their industry. The jobbers in eastern Canada were also organized, said Mr. Bell and their objects were the same as the manufacturer. One thing he asked the meeting to do and that was to promote the sale of Canadian-made goods. He felt it was necessary to do so if they were going to be able to pay their debts to other nations. Most of their electrical goods came from the United States and while they all had a friendly feeling for that country he did not think the U. S. would feel hurt if Canadians tried to sell all the goods they could in Canada and by that means were better able to pay their debts.

Praised the Goodwin Plan

Mr. Frank T. Groome, sales manager Benjamin Electric Company of Toronto, took the opportunity of thanking the association for the fine time he had experienced last year on the Pacific coast when, as he said, he was treated like a prince. Referring to the Goodwin plan he had bumped into this question perhaps more than any other member of the trade. His talks to the contractors in the east had always turned on the Goodwin plan and some of the comments on that plan were very refreshing. As he thought over the plan he had come to the conclusion that what Mr. Goodwin was teaching was a system of, or a new idea of, salesmanship. The modern sales method was to find out what would be of benefit to the customer and that as a rule would benefit humanity. It was along those lines that Mr. Goodwin was working. Mr. McIntyre said it was a plan of common sense and was nothing more or less than applied christian ethics. If a man did what he was taught to do by the moral law he was going to live according to the Goodwin plan.

Accounting Showed a Loss

Mr. J. Ross Smith, Montreal, of the Northern Electric Company's accounting department, placed a new aspect of the business before the meeting when he stated that it required $4 to handle an average order. That included selling expenses and all the incidentals. If they made a sale of $25 and figured their profit at 20 per cent. they would make $5 profit. But if they took $4 from that for expenses they would have only one dollar left. The average value of an order was small so the profit was much less than appeared on the surface.

Tells of Interesting Experience

The experiences of Mr. R. E. Callaghan, manager Toronto branch of the Majestic Electric Supplies Ltd. were highly interesting indicating what he had to contend against to get a footing on the commercial ladder. He had always thought that it was quite possible to do something for himself by trying to believe what he asked other people to believe. If they sincerely meant their intentions, they were bound to succeed to some extent. The object of manufacturing merchandise was to supply the public. They could do this to the best possible advantage and in the most efficient way by seriously considering the public. Personally he had never attempted to do anything in the way of merchandizing an article without first absolutely convincing himself that it was worth while.

"A dealer can do absolutely the same as any other man in business—the dealer of electrical appliances—by trying to treat himself and his fellowmen the same," said Mr. Callaghan. "Occasionally we have a dealer and a jobber, and sometimes a manufacturer, who takes it into his head that he can make headway by cutting prices on the other fellow when the article has a standard price. It has been my experience from close observation that when one particular individual in any unit begins to feel that he is not getting enough business and, in order to get it all, cuts prices against his neighbor who has as good a right to exist and do business, something is wrong.

Reaching the Public

"There are only two ways to reach the public—personal salesmanship and advertising. The largest manufacturers in the world spend fabulous sums for advertising, exploiting their wares to the public. They create an interest at the opportune moment for their article. That appeals to the emotions of the buying public. But all of that would not amount to much if they did not follow it up by hard and persistent and personal salesmanship. We can do the same as the large manufacturer does. How? By paying attention to the business, talking continually, only not as a nuisance."

Mr. Callaghan cited his own experience in the starting of the company with which he is identified and stated that every article sold by him was so much to the retailer as he turned all the money into the retailer's pocket every time he sold a Majestic heater. Now all the jobbers and dealers were selling the heater and all of them could do the same thing if they went about it the same way. "Pay attention to the customer when he comes into the shop," said Mr. Callaghan. "You can buy from that customer something which is just as valuable to you as the article you are selling to him. You are going to buy ideas. There is no customer talks to you about a contracting job but what you can buy something worth while by paying attention to him."

The Get-Together Movement

Speaking of the Get-Together movement, Mr. Callaghan said he was absolutely convinced that if the electrical association that was now practically organized in Ontario, that of the manufacturers and jobbers of Ontario, if that was extended until it was Dominion-wide and if the secretary of that association was the man for the position, he believed that he could regulate things in the course of a very short time where they would have no trouble, at least in Toronto.

In Montreal there started recently half a dozen dealers cutting prices. He was called down to see them and he invited them to luncheon. He pointed out to them they were making a mistake and as a result of that luncheon he had favorable results. There was not a man there who did not agree with him that their policy was a mistake and they did not do that any longer. Continuing, Mr. Callaghan said they should figure their competitor the same as themselves. There never was a time when the Canadian public had more money to spend than today and there was no reason why the electrical trade should not get some of that money or they would find that some more aggressive fellow had been on the job before them.

"You must do something to get that money. And what is that thing?" he asked. Nothing but "mind your business." Make up your mind that you are going to improve the sales from today or tomorrow or the beginning of next month. How? Simply by convincing yourself that you have got the stock the people want and that you are going to tell them. You are going to convince some person in your community that you have something they want and that the price is right and the first thing you know your business will increase and it will only be because of your effort."

Bouquets for Vancouver Association

Short addresses were given by Mr. J. Pim, district manager of the Canadian General Electric Company, Vancouver, and by Messrs. Read and Little, during which they welcomed the convention to Vancouver and expressed the hope that the result of that gathering would be to the benefit of the electrical industry. Mr. Pim stated that the members of the association of Vancouver had stuck together very closely and had met with a large degree of success and what they wanted to do now was to absorb the principles that had been enunciated to them. Mr. Little apologized for the absence of Mr. A. J. Soper, distribution manager of the Northern Electric Co., Montreal, and added that while he had been in B. C. there had been a greater degree of co-operation in the electrical industry than ever he had seen before. A suggestion was made by Mr. Read that there should be formed an Electrical Club and it was his intention to go ahead with such a plan which the president assured him would have the support of every member of the association.

Mr. C. H. E. Williams, who organized the Vancouver association three years ago was called upon for a short address but contented himself by stating that he was satisfied with the results of his work and that he was delighted to see the convention in Vancouver this year.

Some Goodwin Pointers

In the course of a short address before the adjournment for luncheon, Mr. W. L. Goodwin hit the nail on the head with the following:

"If we are going to co-operate we must have some sort of definite plan upon which to launch our activity."

"This great structure we now occupy is the result of a lot of planning and of several specifications and a great many minds have been brought together to build it. If instead, each man had an idea of how the hotel should be built and that he knew better how to build it, we would go back to biblical times and we know the results."

"We have a task in this electrical industry and if someone comes forward with some kind of plan no doubt the task will be well performed."

"There is something about religion that appeals to all of us in its various forms, because, after all, someone is going to decide whether our life has been well spent or not."

Continuing he said that the electrical industry as well as every other industry must not forget that at times they had forgotten there was a supreme power that was going to decide for them and very recently they had learned that that supreme power was the public. "How many men," he asked, "have given really serious consideration to the public? There has been that dominating spirit of selfishness throughout industry. The ideal dominating until a short time ago seemed to be the almighty dollar. We were driving on at a mad pace for a false goal set before us and we learned from the lessons of the great war that commercial supremacy was something to be worked for, and things got so bad that the people of the world had to get together to defend themselves.

"In a similar degree," he continued, "we have practised these same things in the electrical industry. Our mental equilibrium brings us into unison or separates us. All men are not perfect and are not of the same mental proportions and very few men are mentally sound in every respect. The degree to which we bring ourselves into mental equilibrium will lead to success or failure. If you gentlemen in Canada bring yourselves near mental equilibrium then success is assured, bearing in mind all the time that the public is going

A group of delegates at the big Vancouver convention of electrical men from all over Canada—President Brettell, W. L. Goodwin and S. A. Chase in foreground.

to be final supreme court and render a favorable or unfavorable decision. The commitment against law is subject to certain punishment and that is the only way the peace of the country can be maintained.

"We have never," Mr. Goodwin said, "had in industry any penalty for a criminal or immoral act and that is because we were not organized. Men in our midst committed acts we knew to be immoral but, through lack of organization we had no way to punish the guilty. In a small way the organization of the electrical industry will pass decision on the acts of men and they will reward or condemn them according to their acts. That is the lesson we must teach to our brothers in the industry. And the only way we can teach that lesson is through this collective bargaining by your organization.

"I have marvelled that someone did not start long ago to organize the electrical industry not only in the western continent but the whole world. The great principles are being carried on by individual effort and no great undertaking can be accomplished in that way. The greatest good will come to the people of Canada when you so develop yourselves that you will be able to supply everything produced from your factories. The people of the United States and other nations, of course, will gladly supply you with anything you need but your success is going to depend upon your ability to produce these things which you yourselves consume and I am sure the broad gauge minds of the electrical industry of the United States will do everything they can to bring about that very desirable development in Canada.

"I know," Mr. Goodwin proceeded, "that the men who come over here to help you in this co-operative work have no selfish motives behind their effort. We have learned a lesson in the last four or five years that we are not likely to forget. We must freely contribute our services to the undertaking without any regard to the personal reward. We must make sacrifices, and if we enter into the work with that spirit, believing we will do good for ourselves and the people around us by co-operating with the other fellow, then we will at least have the satisfaction of a reward that we have been true to humanity. We must do something to lift humanity out of this gutter of selfishness and we now see in co-operation, a reflection of that spirit in the electrical industry in Canada today, something that is badly needed.

"These ills of the industry are now due to the fact that you have no organization to bring men together to get them into mental equilibrium. If you bring men together your troubles are eliminated in the spirit of good fellowship, and the desire to do good to others. I have felt in the last four years it was very unfortunate for me, due to my physical condition and age, that I was not able to give my services to the great people on the other continent. When I found that I could not go to Europe and do my bit, I undertook two and a half years ago to see if I could not contribute to bringing men together on this continent, and prepare ourselves for the great task that is bound to follow the war. If we can give our services and our life in the battle of freedom, why should we not give an equal proportion to the tasks at home.

"I have no desire or intention to submit a definite plan for your consideration that might be claimed as the only plan, but I hope it will develop at least the basis for some kind of plan modified in such a way as your local needs may require, so that you may struggle with these great problems before you. Because after all no other industry has endeavored to render such services to humanity as has the electrical industry, and if we bear in mind that we are in an industry that demands our all, and we give it up freely, I am sure our reward in this world and in the world to come, will be all we will anticipate."

Merchandizing from the Point of View of the Central Station

At the luncheon which was given the visitors by the Vancouver Association, and at which Mr. E. Brettell presided, an interesting address was given by Mr. W. G. Murrin, assistant general manager of the B. C. Electric Railway Company. In the course of his address which was based on the topic "Merchandizing from a central station's point of view," he said:

"I have been asked to say a few words on the subject of merchandizing from the point of view of the central station and I would like to say how very much I appreciate the honor of having been asked at all to speak at this important gathering.

"The convention which is being held today and tomorrow is a very welcome and pleasing indication of the progress and vitality of the electrical dealers and contractors in this city.

"I have for some time past felt very selfishly pleased and gratified to note the development that is taking place, for this is most obvious to the casual onlooker, and the go-ahead appearance of the electrical stores indicates very closely the increased energy and health of the electrical business in this city.

"That this improvement has been in some large measure brought about by the invaluable work carried on under the auspices of the National Electrical Contractors' and Dealers' Association I am perfectly certain, and seeing that a healthy live energetic body of electrical contractors and dealers is a very important factor in the financial success of a power generating and distributing company it is not necessary for me to label the fact that I very sincerely wish well to the International Association. But to come to the subject of 'Merchandizing from the point of view of the central station.'

"I think it can be fairly said in the last instance that the motive behind every business is a selfish one. By this I do not mean that businesses are necessarily run on narrow lines, but rather that the breadth of view and sound principles adopted by any particular business are adopted wisely because they have been found to pay. For instance, honesty is the best policy because honesty has been found to pay if the matter is looked at from a broad point of view; and this applies to many of the accepted dogma, although the connection is not, at first sight, obvious.

"Assuming that there is this selfish motive underlying the business of the central station and the business of the electrical contractor, I just want to examine the connection between the two and see where it leads to. From the selfish standpoint we commence by believing that the capital invested in the central station and in all pertaining to the supply of power was so invested purely with the object of bringing in an annual revenue sufficient to justify the tying-up of the capital in the first instance.

"Now exactly the same applies in the case of the electrical contractor. He puts his small or large money into a business hoping for a return. In the case of the smaller man he supplements the capital by his personal services; in the case of the large contracting company, the man putting the money in frequently pays someone else to put his personal services in to see that the money so invested brings an adequate return.

The central station is designed to supply power, and it is from the sale of this power that it must obtain its revenue which will give it a return on the capital invested.

It may be that the buildings and equipment necessary for the sale of the power may be particularly suitable to earn revenue from other sources, such as the sale of appliances, lamps, motors, etc. If this is so then the central station is absolutely entitled to get whatever revenue it can from any source of this nature to help pay the return on the capital invested. Its primary aim is to make a profit.

"The contractor carries out wiring contracts, sells fixtures, appliances, etc., and from the profit on these he hopes to pay a return on the capital invested and for the service he puts into the business. As a contractor he has no interest in the first instance in the sale of power; he is interested in the present and eventual profit arising from the sales and transactions that he engages in and in this alone.

"So far there is practically no connection between the central station and the contractor, and unless there is a selfish reason why there should be any departure from this isolated position on the part of the two, mere sentiment will never bring them together.

"I might here mention that in the case of the central station the investment is, as a general rule, very heavy, and in consequence the amount required to pay a return on this investment is so large that the side lines such as the sale of appliances, lamps, etc., play a very small part in relation to the revenue derived from the supply of power.

Large Amount Invested

"To quote our own particular case, we have fifteen million dollars in generating plants and distribution lines in this district, whereas probably the combined capital of all the electrical dealers in the same district would not exceed half a million dollars, so that you will see at a glance how overwhelmingly important the sale of power is to the central station as compared with any other issue. Now just for a moment let us examine where the two come tigether and where they lie apart.

"In order to develop the sale of its product the central station must:

1. Retain its old customers,
2. Obtain new customers,
3. Encourage the use of any current-consuming devices which the public can reasonably be expected to purchase.

"To bring about the first the customer must be satisfied, and dissatisfaction can arise from a number of causes.

"An intermittent or irregular supply of power for instance. This is a matter for which the central station can be entirely responsible, and, in fact, to ensure it, spends many millions. In our own case we have three separate transmission lines to ensure against breakdowns and have a costly steam plant standing idle purely for the purpose of coming into action and taking the most important part of the load in the event of a mishap to the hydro-electric plant; beyond this, the hydro-electric plant itself is constructed on the most permanent and expensive lines. If it were not for the anxiety of the central station to give satisfaction by ensuring the certainty of supply the cost of the apparatus to supply the consumer could be very much less than it is in our particulas case. This in itself is evidence of the most tangible form that the central station places a great value upon the fact that its product must give satisfaction.

"But dissatisfaction may arise from a source over which the central station has no control. The wiring of a house may be carried out on cheap unsatisfactory lines and interruptions to the supply may occur from this cause and neutralize the millions of dollars spent by the central station to ensure regularity of supply.

"Here then, I think, we have the first point of contact. I know that this argument is reciprocal and that the contractor has a legitimate kick if he is carrying on his work on sound durable lines to give satisfaction to the user of electricity and the central station neutralizes his work by giving an irregular supply and discouraging consumers and would-be consumers from placing further orders for electrical wiring and equipment. But the title of my subject is merchandizing from the point of view of the central station and it would take too long to examine from both points of view all the time, therefore I am sticking particularly to my subject.

"Is it not clear that the central station must ensure by any means the high standard of work, that where appliances are used they must by every means in their power see that they are such as will give satisfaction and encourage rather than discourage their extended use?

"The contractor today sees very largely eye for eye with the central station in this particular point for he is long-sighted enough to see that the satisfaction of the consumer is practically as important to him as it is to the central station, and the existence of a body unifying the contractors and leading them by a wise policy to follow the best lines, assits very materially in this matter.

"There is always a danger that seeing the contractor gets his profit in the first instance from the work carried out or the sale of the appliance, that he will in the one case do cheap work so that he may put in a low price and get the business against competition, or in the other case sell an unsatisfactory appliance to get the profit on the sale, rather than not sell anything at all; and, therefore, the central station has to protect itself, and in some cases at considerable cost; establish standards, and protect the public and the short-sighted contractors against themselves. I do not think I need labor this point, for this is one of the reasons why, apart altogether from the question of cost or profit the central station sometimes undertakes merchandizing on its own account.

Wiring in Private Houses

In connection with the quality and design of the wiring installed in houses the fact that there are government regulations controlling this takes a certain responsibility from the central station, and is, in my opinion, a very good thing. The government has not yet established the same control covering equipment installed for the supply of gas, and as a result the Gas Company is continually fighting to maintain a high standard of installation, and the principal opponent is the man who, in order to get a contract for fitting a building for the supply of gas, quotes for undersized pipes and equipment so that he may be able to put in a lower price.

"I stated that the second point necessary to the central station in order to develop the sale of its product was to obtain new customers. Here the interests of the central station and the contractor are distinctly in line. The more popular the electrical service and the greater the encouragement given to the man who has not yet equipped his house, the better for central station and contractor alike. Today there is practically no competition with electricity as a lighting supply and practically every house readily accessible to the distributing system is only too anxious to get equipped. The contractor may sometimes take issue with the central station here inasmuch as the customers are ready to be connected and the central station will not connect them without a considerable proportion of the connection expenses being borne by the customer himself. Here again it is a case of profit that fixes practice.

"The central station wants new customers but it does not want business that can only be carried on at a loss. We will connect any man where the connection costs are not more than three years gross revenue from that man.

To Defray Cost of Service

"If you analyze this you will find that in the case of consumers of this class fifty per cent. of his gross revenue goes to off-set the fixed charge on the cost of connecting him, and fifty per cent. only is left to defray all the cost of giving him service, together with his proportion of the responsibility for the enormous capital invested.

"Deduct from the average consumer's bill the cost of giving him service and, under the condition mentioned above, practically nothing remains to set against the cost of supplying power and we make no profit under these circumstances. This is as far as we can go; to go any farther than this would mean that we are far better off without the consumer than with him, and under these circumstances the contractor must not get sore at the central station for refusing the consumer's business unless he can put up a connection charge commensurate with the outlay.

"It is under the third head of Encouraging the Use of Power-Consuming Devices that the most interesting point of contact arises between the central station and the contractor. I pointed out that with a heavy capitalization the central station must develop the sale of its power at any cost, and power can only be consumed through power-consuming devices. Therefore, the central station is very much interested in the development of the use of power-consuming devices. If it urges the use of power-consuming devices which do not give an adequate return in usefulness for the power that they consume then it defeats its own end by making the device unpopular and discouraging in general the use of power."

Mr. Chase Urges as a Motto for the Electrical Industry—"Live and Help Live"

Mr. Samuel A. Chase briefly addressed the convention on resuming their deliberations after luncheon. He considered it a great opportunity he said that the closing work of his life was asociated with Mr. Goodwin in the task that he was so ably carrying out. After he had heard Bill Goodwin in New Orleans some few years ago, he could think of only one slogan, and that was "Live and Help Live."

In analyzing the various difficulties in the way of perfect harmony and co-operation in the United States, he had made a few notes, some of which had already been touched upon. The principal difficulty had been selfishness, in that each individual and each class had thought himself and his class the best without considering the other classes in the industry. "I think," said Mr. Chase, "that all classes have disregarded proper business ethics. If you call on the professional man say, or your physician, the first question he will ask is who has been attending you. If a waiter is waiting on you at the table, another waiter will not help you with your breakfast. Yet, in the electrical business we look into the other pasture and see it is pretty green, and we forget business ethics in our eagerness to get into the green pasture of our competitor.

"Another difficulty as I see it, is that we have had no definite plan of merchandizing. I do not think we have been ready for a definite plan until Mr. Goodwin came on the scene in the east, and the difficulty in the way of a definite plan was the lack of education menacing various classes. The manufacturer did not look on the jobber with the right attitude of mind, the jobber did not look on the contractor with the right attitude of mind, and so on through the industry.

"But now and for some time we have been ready for a definite plan, and we are putting this definite plan into effect. The principal difficulty in the way of this plan is that the various classes do not recognize the services rendered by the other classes. Another very important point, and one that has caused a great deal of trouble is misunderstanding. Misunderstandings arose because we did not get together, and iron out our difficulties. I do not think any of the various classes, the manufacture, the jobber, the central station, or the contractor dealer, desired to do any of the other classes any injustice, but it is just through lack of this education and knowledge of the other fellow's problems, and also the fact that they cannot understand each other's language that these difficulties have become mountains in the eyes of the electrical industry.

"It is only through getting together with open minds that all these various difficulties fade away into insignificance. The spirit of the times seems to be to get together, not in an illegal way, but to discuss various problems, and iron them out, and get acquainted with one another. You may be interested to know something of the progress that we are making in the United States. In California and Oregon the situation seems to be pretty nearly a hundred per cent. That is principally due to the fact that Goodwin planned a good many years there before he went east. The situation in the balance of the States is that it is good in some spots and bad in others, but it is improving all the time, and there is no situation too bad but we feel we can get good results.

"Make love to your competitors." You will get along a great deal better, and you will find they are all good fellows. I have no hesitation in saying that in the parts of the country we have been cultivating, we will get good crops. The National Contractors' Association never was as prosperous as at the present. The National Association needs you because of its prosperity. At the same time the National Association wants to have a hundred per cent. membership among the contractors.

"Individually we are weak," said Mr. Chase in conclusion. "None of you can accomplish much, individually, with the manufacturer, but collectively, that is from an association standpoint, you can accomplish anything that is right. I want to make a strong plea and leave this thought with you, that is, to apply this slogan personally, and in your business—"Live and help live."

In the Evening Mr. Goodwin Addressed the Banqueters—The Wheatstone Bridge Again

The feature of the evening banquet was the address delivered by Mr. W. L. Goodwin. There was a very large attendance and the address was listened to throughout with close attention. Mr. Goodwin occupied an hour and half in delivery and used a diagram to illustrate some of his remarks. He made it clear that without organization the electrical industry need not expect to make any progress and that the system that had prevailed of always being at each other's throat was not going to get them anywhere. It was a masterly exposition of the position of the members of the electrical industry. In part, he said:

"The men of the electric industry have been greatly derelict in their duty for a long time, and it is my task to travel about the country and tell men their faults in language they can understand. We have got to learn much to our sorrow, that there was something wrong in the world in the last few years. Just what it was we did not know. We permitted this wrong to drift on for many years until it came to a climax in this war. The system in the world, from the standpoint of commercial activity, is wrong and must be changed. I think we all admit it is wrong, and many of us know wherein it is wrong. But due to that selfishness which human nature displays, we hesitate to do anything towards the changed condition.

"The ideal for which we have longed in the past, has been the wrong kind of ideal. Success in later years has been measured by financial prosperity, and when you make the measure of success the almighty dollar, without any respect to the means by which that success is gained, you are bound to precipitate a world condition that sooner or later, is going to end in disaster. That is just what has been happening in the world. This state of war between nations is due nearly always, to economic causes. Trouble or friction, or competition between interests is invariably due to economic conditions, and to remove the trouble you must readjust the economic situation of the world, or of the economic situation existing between competitors. That is very simple to understand if we will take the time to analyze the situation.

"Some people take great delight in erecting monuments and contributing their resources to communities, but I prefer to devote my time to the development of humanity in a field of endeavor which I understand. So I have elected to devote my time to causing people in the electrical industry to understand the underlying economic causes which precipitate vindictive competition. We have a very complex situation to deal with. I think there is no other industry that has such a multiplicity of problems to deal with as has the electrical industry. We have all the problems common to finance, management, accounting, merchandizing, selling and warehousing. Then we have the more intricate problem of relationship between great public utility companies operating sometimes under private charter, and operated sometimes by municipalities.

"We have the great problem of engineering and development in order to advance our industry—not common to any other industry—and we have the more intricate problem in that the incentive to succeed varies to a large measure with the different groups who are interested. The incentive to prosper on the part of the public utility company is entirely different from the incentive to the electrical contractor which is also different from the incentive to the jobber. We have these four great groups in the electrical industry of public utility companies or central stations, manufacturers, wholesalers or jobbers, and contractors and dealers or retailers. Without a full appreciation of the problem before us, we set out twenty years ago to organize these four great groups for purely selfish interest. I am sorry to say I was one of the pioneers, and as I understood the situation at that time, we organized the jobbers of the United States for the sole purpose of advancing ourselves against the other groups in the industry. At no time did we ever consider the economic problems that confronted the electrical industry.

"Meanwhile the central station industry was organized along similar lines, and the manufacturers and the retailers as well, until we built up these four great group organizations, and these four great interests have been at each other's throats over twenty years trying to destroy each other. Men blamed one another for the faults that they developed, and there are so many faults—sone one has called them the ills of the industry. They have not been very serious because of the rapid development of the industry, and the unknown commodity we have sold has led to unusual profits, and the public have paid paid the price without knowing the value of the services rendered.

Relative Value of Electrical Energy

"In the electrical industry we have no known relative value due to the fact that we do not understand it. No man has been able to define electric energy. We know what it will do, but when we are asked what the thing is we are selling, we do not know. We have never been able to measure its real value, evidenced by the fact that in the United States you will find as many rates for electrical energy as there are central stations, some three thousand rates or prices charged for exactly the same commodity. We have not employed any scientific method to arrive at a value of the commodity we sell. Competition has not perhaps reduced us to that state where we have felt the necessity of coming down to mother earth to determine the real value of the commodity we sell.

"The great public utility companies of the United States have concentrated on the most miserable type of advertising. These great public utility companies have a message to deliver to the public, something to tell them about electricity and what it would do in simplifying living. But instead of doing that, they select the cheap common method of bargain sales advertising. For a period of years one of the largest companies never placed a single advertisement except a bargain sale article. That convinced me we have had a wrong conception of our industry.

Organized Into the Big Four

"We have organized these four great groups, and they have become powerful interests, but what do they consist of. We have in the United States, 25,000 electrical contractor-dealers, 175,000 other retailers, including department stores and hardware stores—200,000 stores engaged in the retail electrical business, without any semblance of an organization to bring them together to work for a common interest. We have 1,900 electrical manufacturers, and no common relationship between them. They employ 700,000 men. Then we have 5,000 public utility companies supplying power, and no means of bringing them together. The whole industry employs 7,000,000 people, and this conglomerate mass of interests have been struggling with this problem, and have been at each other's throats for twenty years, on the principle of the survival of the fittest. Is it any wonder that electrical men in Vancouver struggle with the problem, and are unable to get an answer.

"Our engineering problems have been handled in the most efficient way. We have provided simple formulae and when an engineering problem is presented we apply one of these and in a short time we get the correct answer. But when it comes to merchandizing it is each fellow for himself. One man in Vancouver said he preferred to go alone. That is unfortunate and we cannot permit that to go on. The labor unions were organized because men were unable to go alone and they just had to organize themselves in order to defend themselves and because there is not a right relationship between capital and labor there has been set up a condition in this country and in the United States where might is presumed to be the deciding factor in a controversy today. Power will never settle any dispute that arises between capital and labor.

"The economic cause that precipitates the trouble must be removed, and, if we analyze the economic cause we can determine the right answer and, if capital on the one hand, and labor on the other demand to exercise their power and control the situation without any respect to the underlying economic cause it is naturally the signal for further retaliation and the other side strengthens its position so that they can come back. When we find any old problem we must get right down to the underlying causes that precipitate these difficulties and have a clear idea of what the underlying cause is.

Vicious Thing in Modern Government

"The most vicious thing that has been set up in the modern government is the desire of politicians to appeal to the popular sentiment without any regard to the merits of the case at issue. Politicians are keen to sense public sentiment and they go that way whether the public is right or wrong. And that precipitates trouble. We expect our leaders to lead us along the safe road but simply for political popularity they lead us to disaster. An so we must have in the days to come a new type of politician, men who will respect honor rather than a simple desire to please for the moment."

Speaking on the question of co-operation, Mr. Goodwin said the general idea was to let the other fellow do all the co-operating. There seemed to be a sort of human desire to precipitate jealousy between the great powerful corporations and the small individual company. Men took a delight in criticizing the methods of the great corporations and perhaps at times they were justified. But they seldom ever gave the devil his due and were it not for the great pioneer work done by the corporations particularly in the electrical business he questioned very much if the city of Vancouver would be here today. It was only through these corporations that this virgin country of Canada could be developed. What chance would a lone man have if he delved into this great wilderness, of converting it into a thriving country?

"What we must do," continued Mr. Goodwin, "is to find some means of common interest and common relationship between those widely-separated interests. And I say that co-operation is the means of bringing us together. But not co-operation in an abstract way as it has been put for years. In other words we must be prepared to do one or two things. Either we must find a common ground upon which these two widely-separated interests can meet or we must pull the corporations down to the level of the little man or lift the little man up to the level of the corporations. How are we going to do it? We are going to do it by clear understanding of the economic causes which precipitate trouble between the various groups in the electrical industry.

And What About Trade Discount?

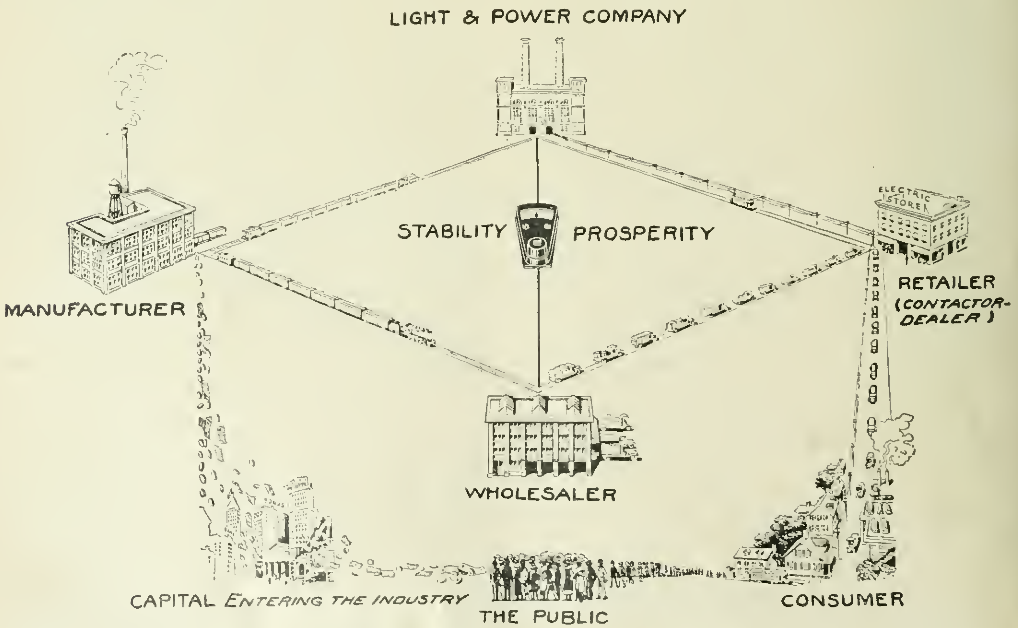
"There is one thing I want to say and that is that we have not had a clear conception of trade discount. Very few men, if any, in the electrical industry have a clear conception of the difference between trade discount and compensation for services rendered. The trade discount has come to be known as the medium of exchange allowed in discount for quantities purchased and that is quite distinct from what I call compensation for services rendered. We have never had a scientific treatment of this broad question of trade discount. An analysis of the statement of 1,800 jobbers and manufacturers develops the fact that not a single one took into consideration the economic problems involved in distributing a particular commodity. We make not relative distinction in prices or discounts based on handling goods and, goods are sold from producer to consumer without any regard to the cost involved in distributing or selling. This must be corrected.

"'Compensation for services rendered has never been understood and, because of that we have developed a situation whereby two stores, one a jobber and the other a contractor-dealer render exactly the same service to the same purchaser and receive compensation varying at times as much as 50 to 100 per cent. The condition under which we are living are what I call immoral in the electrical business. The men have grown up to be selfish. They have been set against this great force of competition without understanding what it is about and have become selfish and the men of Vancouver in the electrical business are no different from what they are in other parts of the world.

"Manufacturers and jobbers and very often the public companies have preferred to keep the contractor and dealer in ignorance. Whenever we get to the bottom of this subject and start to talk real problems someone says let us iron out our difficulties and we will have a closed meeting and in that way we keep in ignorance the other groups. It is only in the last two years we have developed to a point where we frankly discuss these problems before our competitors and in that way we get to an understanding of the other's problems. It is a process of commercial education and when men are educated to that extent they can go on and prosper.

How to Study Their Problems

"How are we going to present to the men in the electrical industry a clear understanding of their problems?" Mr. Goodwin asked. "Can we do it by discussing our selfish interests of group organization? No. We have tried that and it does not work. We must find a means of bringing all the men to-



Mr. Goodwin uses the Wheatstone Bridge to illustrate his plan of co-ordinating the various sections of the electrical industry—manufacturer, central station, jobber, contractor-dealer. In the Wheatstone Bridge, prosperity, (the galvanometer), is stabilized only when each section is working in balanced unison with every other section.

gether to handle our problems and let each man have an understanding and set our to correct our ills. The jobber occupies and undue advantage over the contractor-dealer in his ability to compete. When the jobbers clearly understand the advantage they possess and, knowing they have that advantage they are willing to give up certain of their rights and place themselves on an equality to sell to the contractor-dealer, their position is going to be preserved and if they are not big enough to realize the situation and voluntarily give up the advantages which they enjoy, then the electrical industry must take away from the jobber that thing which is preventing us getting together.

"If the great utility companies of Canada and elsewhere precipitate a kind of competition with contractors and dealers in the sale of appliances they produce unfair competition or a kind of competition that the contractors and dealers cannot meet, then we must go to the public utility companies and point out the error of their ways and if they are real men they will give up their advantages. And if they do not, we as electrical men must organize to see that this practice must cease. By that I mean this—that a great public utility company, primarily engaged in selling energy must not parasite the appliance business at the cost of the dealers and jobbers.

Immoral Practices in Trade to Cease

"I have no idea of asking any concern," Mr. Goodwin continued, "to give up part of the business they are engaged in but I do insist they cease this practice of unfair competition, this immoral practice in taking advantage of the other fellow. And if we are not big enough to see that situation and correct the fault ourselves we must expect the power to be developed that will take that thing from us. The judge of this whole thing must be the public. They are going to decide whether we have acted fairly and wisely. And some of the things the public are doing today and the opinions they form about the electrical business, perhaps are founded on the fact that we have not acted wisely and well. And so we must start a new order of things. We must determine every fault in our industry and set ourselves to correct those faults.

"The first fault is lack of proper organization. It is only recently you had any semblance of organization in Canada. And I think you will agree with me that, as a result of the pioneer work on the part of Mr. Williams, Mr. Brettell and Capt. Conway, that a spirit prevails which would never have been possible in the days you were without organization. Carry that spirit along and bear in mind all the time that your success will be measured by your efforts to satisfy the public."

Mr. Goodwin mentioned that every year the electrical industry of Canada and the United States must have $600,000,000 for development work and how could they expect that money from the four groups of the industry if they were fighting for supremacy. That money, he added, must come from the public. And so their first problem was to establish confidence in the public. It was obvious that the public were to the one determining factor in their problems He was against bargain sales or instalment sales. Any of these in reason were good business. But the bargain sales that started at the beginning of the year and ended on December 31st no longer appealed to anyone.

From a Scientific Standpoint

The solution of their commercial problems depended on a careful analysis of cause and effect and to do this they must approach these problems from a scientific standpoint. They should bear in mind that they need not be engaged in so-called scientific problems in order to apply scientific methods. If they approached this question in that way they would get an understanding of the factors involved and then they would approach the problems without bias or suspicion.

"What does this plan mean?" he asked. "It is a campaign of commercial education. We must develop a condition of things when men and women must have a means of continuing their education so that they are adapted to meet the average problems that confront them. Education in commercial activities must come through the medium of the trade organization where we have a free exchange of ideas. And so this plan of mine reduced to a simple statement is a campaign of education, educating members through trade papers, trade organizations and other channels and bringing together the various units in the electrical industry.

"The basis of the campaign," said Mr. Goodwin in conclusion, "is that each individual owes a responsibility to the organization, that the organization owes a similar responsibility to its member, that each organization owes a responsibility to the other organizations in the industry to the end that all problems may be discussed having in view the interests of all."

Explains the Wheatstone Bridge

In using the Wheatstone bridge as a method of illustrating his remarks, Mr. Goodwin explained that the Wheatstone bridge furnishes an excellent analogy of the method of scientific merchandizing in the electrical industry. The battery, the source of energy, represents the public whose investors furnish the capital for all branches of the industry. This capital, the manufacturer converts into generating and distributing equipment for the central station or industrial, or into appliances and supplies. His sales diverge as shown in the diagram, dependent upon the principal class of product utilized by each branch. The central station has electric service as its principal product which, it will be noted, is used through the wiring installed principally by the contractor-dealer. The wholesaler has as his principal function problems affecting wholesale electrical merchandizing. He makes contact with the central station or the contractor-dealer in passing to the consumer. The contractor-dealer thus becomes the point of retail contact of the manufacturer, central station, and wholesale with the consuming public which, by the way, following the circuit, brings us back to the negative side of the battery, thus completing the analogy.

Nothing in the diagram indicates, nor is it the intention to restrain in any form, either of the interests referred to in performing the function of another, but due regard to the interests of all should be recognized in order that the scientific plan of merchandizing under the Wheatstone bridge principle will not indicate on the galvanometer an unbalanced condition which now exists.

When each interest operates with a due regard to the interests of the others the galvanometer will indicate at zero, an evidence of a balanced condition which, when applied to electrical merchandizing and the electrical industry is reflected as stability and prosperity.

A Heart to Heart Talk

Part of the morning session of the second day's proceedings of the convention developed into a heart to heart talk between contractors and dealers and others and the answering of a number of questions by Mr. Goodwin as to the proper course to adopt in certain problems. The policy of the B. C. Electric Railway Company in selling irons at a lower price than that quoted by the other electrical dealers was explained by Mr W. G. Murrin, assistant general manager of the company. His company, said Mr. Murrin, was vitally interested in the sale of electric energy and consequently in the sale of any appliance that would use up that power and the iron was very valuable in this respect. He stated, however, that his company was willing to eliminate the cut-rate for one year and see the result of the co-operative sale, a statement which was received with great enthusiasm.

Need Campaign of Advertising

Mr. Goodwin emphasized the need for intensive sale methods. He thought the various branches of the electrical industry should get together and conduct a campaign of advertising. That the dealers should rise to the occasion, in view of the offer of the B. C. Electric was the statement of Mr. Chase who said he sympathized with that concern in its increasing difficulties.

Answering a question as to the benefit which could be rendered by electrical inspectors, Mr. Goodwin explained that their function should be to eliminate the unscrupulous and transient contractor. He suggested that a committee be appointed to draft a code of rules in order to safeguard life and property from faulty installation, motors and switches. At the same time, said Mr. Goodwin, the code should be flexible to provide for an expansion of business.

Replying to a question as to what the association could do if one man broke away or refused to enter their ranks, Mr. Goodwin said there were all kinds of parasites in the world. The contractor often had difficulty in selling an idea to a man.

One of the most important questions put to Mr. Goodwin was in respect to the legal aspect of the question, whether a dealer could refuse to sell to a man who was not a member of the organization. "The association in Vancouver and the individual jobber have taken legal advice and have been told that they cannot refuse to sell to a man who is not in the association," was the statement made by one of the members.

Law on a Delicate Problem

"I challenge any attorney in Canada," said Mr. Goodwin in reply, "to come into this room and tell me I cannot run my business as I please and that I cannot refuse any business that does not look good to me. I do not believe you have any laws in Canada that are tighter than the Sherman or the Clayton Act we have in the United States. There is no law in Canada," said Mr. Goodwin with considerable emphasis, "that compels you to sell to a man you believe is a menace to your business. Because that goes back to the old common law of England— the individual right of a man to conduct himself as he wishes so long as he conforms to the regulations.

"Collectively," said Mr. Goodwin, "this crowd cannot say they will not sell to a man. The jobbers can get together and if you educate each and every man you individually can go out of this room and refuse to sell to a man whom you believe is a menace to the electrical business."

"You cannot refuse to sell if he is willing to pay the price," remarked another member.

"In the United States the only people who must give service are the public utility companies who are operating under charter. It seems to me that you must figure out the class of people in your community who are undesirable. Don't do it like collective bargaining because you are likely to go to jail."

Answering other questions, Mr. Goodwin stated he was in accord with the idea of not keeping the association a sectional one. Alluding to the accounting matter he said they wanted standardized accounting methods. As to the labor question so far as it affected wages, he replied that he preferred to leave that in the hands of each individual firm and added that he always paid his men more than the union scale of wages.

With respect to the education of the architect class, Mr. Goodwin was asked how the four groups could co-operate to do so and in reply said they had to educate the contractors and architects in order to do away with foxy specifications. They should have a committee to deal with the architects.

The matter of the appointment of a delegate to the National convention in Milwaukee from July 14 to 20 was left over to be taken up by the association.

Explaining the position of the B. C. association in regard to the national organization which Mr. C. H. E. Williams was anxious to get information on, Mr. Goodwin stated that the National Association was originally made up of 17 men on the executive committee. Six were from the Atlantic, six from the central district, two from the Pacific and three at large. When the Canadian division was formed he thought provision was made for two delegates from that division, their expenses to be paid by the division. There was some differential set up for the dues of the Canadian members so that the expenses would not be too heavy. He believed the National executive had been increased by two members, one from eastern Canada and one from the west. He understood the expenses were borne by the association.

In reply to another question as to whether the jobbers in B. C. were associated with the jobbers south of the international line, Mr. Goodwin said that was their ultimate goal.

The Open Price System

On the matter of the open price question, Mr. Goodwin stated that he would suggest they should get a copy of Jerome Eddy's book entitled "The New Competition" which dealt with this subject very fully. Meanwhile they ought to go into this Open Price Plan and try and make it effective in some way as it would inject confidence and put them in a position to successfully combat this miserable method of parcelling out bids and telling the lowest contractor what a good fellow he was but adding that he would have to cut his bid.

Mr. Chase gave a brief address on the problem of producing results after such a convention. Resolutions passed at such a gathering were often unsatisfactory because they did not produce results, said Mr. Chase. If they would take advantage of Mr. Murrin's offer he believed that good results would follow their meetings.

Before the meeting separated to be the guests of the Rotary Club at luncheon, Mr. Goodwin submitted the twenty-one points in the Goodwin plan, which he said he had not had time at the banquet to give them. They were as follows:

(1) A strong and representative association of electrical contractor-dealers (retailers) and urges all interests to lend immediate assistance to this end.

(2) That each division of the industry prepare a code of ethics outlifting its own functions, relations and responsibilities to each of the other divisions of the industry.

(3) That each division establish a code of practice outlining its methods, policies, etc., in dealing with other than divisions within the industry.

(4) Improvement on merchandizing methods, better display, and the encouragement of more retailers, by urging present contractors to open retail stores, thereby enlisting the support of central stations and offering a broader and larger outlet for manufacturers.

(5) Recognition of the service functions of the contractor-dealer and recommends a differential when this service is performed.

(6) The sale of high-grade electrical material; the establishment of high-class specialty retail shops; improved specifications in wiring installations; and the introduction of liberal use of convenience receptacles.

(7) Broader education of the public concerning the problems of the electrical industry, and concerning electricity, its use, and the application of household devices.

(8) Retailers applying intensive sales methods in con-

nection with small devices used in home, factory, office, etc. (such as washing machines, vacuum cleaners, dishwashers, electric ranges, electric heaters, household heating devices, sewing machine motors, fans, lamps, portables, fixtures, vibrators, hair dryers, ice machines, etc.)

(9) The introduction and application of proper cost-accounting methods in wholesale and retail merchandizing, particularly if either function is a minor department of a company.

(10) Free and unobstructed flow of trade along most economic channels, without attempt to direct it through fixed channels.

(11) That central stations conducting retail departments for the sale of lamps, appliances, devices, portables, etc., operate same in accordance with the ethics of retailing and with full regard to proper cost accounting.

(12) That all interests conducting retail departments for the sale of lamps, appliances, devices, portables, etc., operate at a profit. The adoption of this policy on part of central stations and jobbers will result in a large number of concerns entering the retail field.

(13) Recognition of the service function of jobbers in the distribution of supplies and recommends a differential when full service is performed, and a proportionate differential when only a partial service is rendered.

(14) Jobbers determining through proper cost accounting, the cost of warehousing, and selling their principal commodities, to the end that each principal commodity will carry its proper portion of overhead.

(15) Open meeting of all trade associations, including meetings of executive committees.

(16) That the electrical press become an integral part of each division by honorary or associate membership, and that unrestricted publicity be given the proceedings of all meetings.

(17) The formation of a national lecture bureau, with state and local staffs. The function of the staff would be to carry on educational work within the industry and before public gatherings. Service to be gratuitous.

(18) Recognition of the principle that any action taken by a single division which affects another division is seldom satisfactory unless each division affected is represented.

(19) The appointment of committees by the National Electric Light Association, Electrical Supply Jobbers' Association, National Association of Electrical Contractors and dealers, and various manufacturers' associations to meet together to study the problems of the industry and to cooperate in finding their solution.

(20) Consolidating or reconstructing overlapping organizations. A committee comprising representatives from each association should be formed to study this question and submit a plan.

(21) Eventually a single organization in the electrical industry, consisting of national, division, state and local sections; also main national sections for the solution only of functional problems of the several branches or groups.

Sparks from the Convention

President Brettell handled the convention admirably and never allowed the speakers to get away from the point of contact. He was at the switch all the time.

Secretary Capt. Conway was an able assistant and looked after the arrangements in capital style. There was not the slightest hitch in anything and the captain is to be congratulated accordingly.

One of the happiest men at the sessions was our old friend, C. H. E. Williams, the actual founder of the Vancouver association three years ago. He wore the smile that made everybody happy and he took the compliments showered on him for his pioneer work, with becoming modesty.

Among those who helped to make the convention a success were the following who constituted the programme and organization committee: Messrs. J. Read, E. E. Walker, S. E. Jarvis, J. E. Rowland, C. Moulton, J. J. Crossman, R. A. Graham, J. Duck, S. R. Smith and E. Brettell.

The committee in charge of the financial arrangements were: Messrs. C. H. E. Williams, F. Williams, H. Rees, J. E. Rowland and E. Brettell, while every member of the Vancouver association was on the reception committee.

There were no decorations at the convention, every

Mr. E. Brettell, President B. C. Association Electrical Contractors and Dealers

Captain W. J. Conway, Secretary B. C. Ass'n. Electrical Contractors and Dealers member doing his utmost to bring it off with honors, and in this they succeeded one hundred per cent.

The ladies were looked after too. On the first day they were given an auto trip round Stanley Park and had tea in the pavilion where they were joined by the mere males after the latter had concluded their afternoon session.

The banquet was a humdinger. The menu was characteristically high-class, in the best style of the Hotel Vancouver and close on two hundred guests sat down. There was classical music by the orchestra and other musical numbers by professionals and members of the association who showed that there is considerable talent of this kind among them.

Living up to their slogan of "Service" the Rotary Club did the second day's luncheon up to their usual standard. Messrs. Goodwin and Chase were the speakers and they were accorded a cordial reception, as was every member of the association.

Not the least interesting feature of the gathering was the trip to the power-house of the B. C. Electric up the North Arm of Burrard Inlet. In contra-distinction to the weather that had prevailed in the earlier stages of the convention, the afternoon was fine and as a result 140 persons made the journey.

They were received at the power-house by superintendent F. Elwell and on the trip were accompanied by the following officials of the B. C. Electric: W. G. Murrin, assistant general manager; E. H. Adams, controller; E. E. Walker, sales manager; W. Saville, general secretary and James Lightbody, publicity agent.

Tea was served in the transformer room at No. 1 plant and the thanks of the association were fittingly conveyed to the company for its hospitality. In the evening the members and visitors attended the Orpheum theatre as the guests of the Vancouver association.

J. Herbert Hall, chairman of the Canadian Associated Manufacturers of Electrical Supplies wired from Toronto as follows: "This association is anxious and willing to cooperate in any way to further the interests of the electrical industry as a whole. May your convention be a success and lead to a betterment of conditions and business in this great Canada of ours."

W. H. Morton, general manager of the National Association sent this message: "Greetings and best wishes for a successful meeting from the National Association. You should elect a member of the National executive committee to be one of the two from the Canadian division. Hope you are making plans for one hundred per cent. attendance at the Milwaukee convention in July."

From Kenneth A. McIntyre came this communication along the wires: "Ontario Association sends greetings and best wishes to British Columbia Association on occasion of your great convention. Regret we cannot be represented this year but will not fail next time."

E. Jewitt, acting secrtary of the Canadian Electrical Supply Jobbers' Association, had this to say in a letter after sending their greeting: "We believe that associations such as are now being organized in the electrical industry throughout Canada will be the means of vastly increasing electrical business in Canada and will put the industry on a higher plane than it has ever enjoyed."

A letter was received from Senator Frederic Nicholls, president Canadian General Electric Company Ltd., Toronto, regretting his inability to be present; also one from H. J. Gille, sales manager of the Puget Sound Traction Light and Power Company, as well as from a number of others.

Lt.-Col. T. G. Bird, D.S.O., who has just returned from the front, was expected to be in attendance but it was explained that he had been delayed coming through the mountains.

Mr. A. S. Edger, of the C. G. E., Toronto, and Mr. A. J. Soper, of the Northern Electric, Montreal, were also unavoidably absent.

Mayor R. H. Gale and Mrs. Gale were guests at the banquet on the evening of May 26 when the chief magistrate delivered a characteristic address dealing with his earlier experiences in the electrical industry.

Montreal Electrical Contractors' Organization Discuss Constitution

A Montreal Electrical Contractors' Association is now a reality. The body has the backing of the largest firms, English and French Canadian. Although the contractors were primarily brought together to consider the demands of the workers, those who attended the preliminary meetings quickly came to the conclusion that a permanent organization was the only way to deal with such questions. The preliminary meetings were exceptionally well attended, and the body quickly organized. The association will have the advantage of being affiliated with the Association of Montreal Building & Construction Industries, with its own section, officers, and constitution, and with representatives on the parent body.

The second meeting was held on May 30, Mr. F. J. Parsons (McDonald & Willson Co.) presiding. The principal business was to receive a report of a temporary committee appointed to consider the question of organization, constitution, etc. This report was presented by Mr. A. S. Henry (Canadian Comstock Co., Ltd.) who pointed out that the working men, realizing the strength that was in unity, had organized into associations. A few years ago, in the mind of the average contractor, any thought of a condition of co-operation or relation between the contracting interests and labor interests would have been classified as absurd and dangerous. The ultimate uplift of their business could, he believed, be only permanently accomplished by proper coordination of the interests of the employer and employee. If they were to work out on a fundamental basis the problem of labor in Montreal, it could only be done by organization and united action on the part of the electrical contractors. There was much to be done collectively in raising the standard of their work. No calling required greater skill than theirs, and yet they were regarded as mediocre; electrical contractors were important in every building operation, and how could they show the importance of their business better than by organizing, by becoming better acquainted through frequent meeting, by exchanging views, and by accepting the modern doctrine of business, publicity, price fixing used to be the order of the day and the principal function of trade organization; it had, however, never been successful, as it was not founded on sound economic principles. Co-operation in competition, in a relatively small body like their own, should be founded on an exchange of views on questions of management, organization, financing, selling, credits, forms of contracts, collections, and overhead expense and its relation to price quotation.

The proposed constitution was then read in English and French, and the first clause passed. This proposed that the name should be the Electrical Contractors' Association of Montreal, affiliated with the Association of Montreal Building & Construction Industries.

The balance of the constitution was referred to the executive committee for report.

Mr. R. Moncel (Moncel Electric Co.) was appointed president, and Mr. F. J. Parsons vice-president. The executive committee are Messrs. H. Vincent and J. St. Amour.

The temporary committee presented a detailed report of a proposed agreement for wages and working conditions with the local branch of the International Electrical Workers' Union. This was left for further discussion.

The Association further discussed the question of a working agreement with the International Brotherhood of Electrical Workers, at a meeting held on June 5. Mr. Moncel presided.

The meeting debated at considerable length the question of recognizing the union. A resolution was proposed to the effect that the executive committee be empowered to take up with the union the question of entering into an agreement for working, and report to the Association. An amendment was proposed declining to recognize any labor union and leaving to each individual or firm to deal with the union as they seem fit. The amendment was carried.

Mr. Vincent brought up the question of the examination of wiremen and the licensing of contractors.

Mr. Simoneau also referred to the fact that many workmen did a considerable amount of work on their own account at night, to the detriment of the contractors.

Mr. Trotter, the secretary, pointed out that another section of the Association of Montreal Building and Construction Industries had similar trouble. The section referred to secured the business cards and notepaper of these mushroom firms. A visit was paid to the city assessor, and the firms soon went out of business.

The subject of various stores, outside of the electrical business, including drug stores, was also referred to.

The executive committee will go over the proposed by-laws and report to a special meeting.

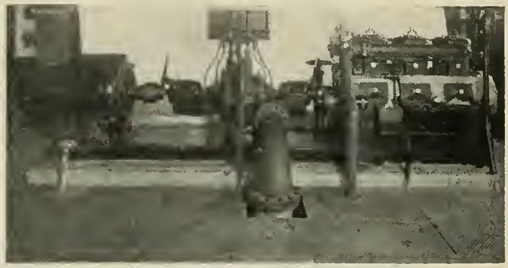
Robbins & Myers Expanding

The Robbins & Myers Company, Springfield, Ohio, have just acquired five and one-half acres of ground and all the factory buildings of the James Leffel Water Wheel Company, which adjoins their plant. This, together with the buildings already occupied by the Robbins & Myers Company, give them a continuous floor space of about 500,000 square feet and about fourteen acres of ground. The company will take possession of the new plant as soon as possible and will increase their working force from about 3,000 to over 5,000. This, it is said, will make them the largest exclusive electric fan and motor manufacturers in the world. The company commenced in a small casting foundry shop in 1878, under the ownership of Chandler Robbins and James A. Myers. In 1867 Mr. C. F. McGilvray, who is now president, joined the firm as superintendent. In 1896, with about 200 employees, they entered the electrical field, manufacturing ceiling, desk and bracket fans. In 1899 they built their first power motors. The year following James A. Myers, H. E. Myers and C. F. McGilvray purchased the interests of Chandler Robbins and continued the firm as the Robbins & Myers Company. The purchase from John W. Bookwalter of the old rake factory in 1899 formed the nucleus for the present R. & M. main plant, which was reconstructed in 1907. The complete destruction of the R. & M. foundry in 1911 resulted in erection of Plant Two the following year. Plant Three in the Shuey building was acquired in 1918, and the new warehouse was also built last year. With the retirement in 1915 of H. E. Myers, the official personnel of the company became C. F. McGilvray, president; Wilbur J. Myers, vice-president; and Warren A. Myers, secretary. In 1917 H. E. Freeman joined the company as treasurer.

The Bell Telephone Co. will issue $4,500,000 of new capital stock, raising the capital to $22,500,000. The issue is at par, with each shareholder entitled to subscribe for one new share for every four now held.

A Gasoline Waterworks Standby

A neat installation at Lindsay, Ont., is shown in the illustration. It represents a Sterling engine, manufactured by the Sterling Engine Company, of Buffalo, acting as a standby to the motor driven pump. The engine is gasoline driven and in case of failure of the hydro lines, may be started immediately and operated indefinitely. The company state that there are today numerous units of this engine installed in townships, villages and factories as standby plants for fire protection, driving centrifugal pumps and generators. The engines are equipped with electric starter and generator, battery driven, and are made in six sizes, varying in horse-power from 12 to 200. The equipment is backed by an organization represented in practically every country on the globe. The marine product has been manufactured for over fourteen years, during which it has been used extensively by the United States and other foreign navies. The racing engine built by this company has held the world's speed record for eight consecutive years. This engine is also used direct connected to generators for isolated plant operation.



"Sterling" engine operates pump in case of failure of electric power

Electrically Welded Tank

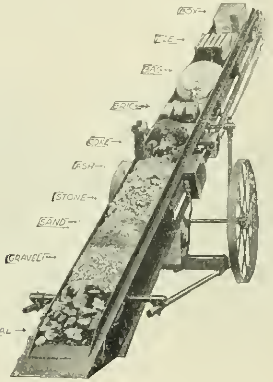
What is perhaps the first electrically welded tank ever made in Canada has just been completed by the Lincoln Electric Company of Canada, Limited. This tank was made for the Canadian Ice Machine Company, of 3/16 inch plate completely welded throughout. One longitudinal seam runs along the bottom and there is another seam about the middle of the tank. The joints were butt welded. Very little labor was required for the job, the plates being held in place by two helpers while the welder tacked them together at intervals. He was then enabled to complete the tank without any further assistance. The accompanying illustration is a photograph of the tank upon completion.

Electrically-welded tank, made by Lincoln Electric Company

The city council of Edmonton, Alta., have decided to go ahead with extensions and improvements to the telephone system at a cost of approximately $300,000.

Economic Handling of Coal

A new type of motor-operated portable conveyor, manufactured by the Portable Machinery Company, Passaic, N.J., is shown in the accompanying illustration. While there are an unlimited number of uses to which this conveyor can be put, it is particularly suitable for the handling of coal or ashes around the power plant. Coal may be unloaded direct from hopper bottom cars into wagons, making unnecessary the use of a pit or overhead track. A distinctive feature of this equipment is the scoop on the feeding end which can be pushed, or completely buried, in the material to be conveyed. This makes it possible to simply scrape the material onto the carrying belt instead of lifting it up by shovelfuls into the feeding hoppers of ordinary conveyors. It is said by makers that, with the "Scoop" conveyor one man can unload coal from hopper bottom cars at the rate of one ton in from three to six minutes.



This portable conveyor is readily adjustable to all varieties of materials

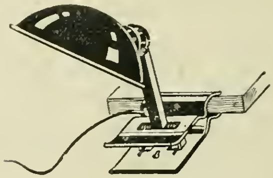
Menominee Fans

The accompanying illustration shows one of the types of Menominee fans distributed by the Masco Company, Limited, 91 Queen Street East, Toronto. Merchants in all lines are more than ever interested in the electric fan as an aid to customer-comfort. Housekeepers who may in former years have thought the electric fan a purely commercial necessity, now realize that it fills a long-felt want in the home as well as in the office. This should be the biggest year on record for electric fan sales and every dealer will, of course, profit to the extent that he goes after the business.

Plans now under way for a C. N. R. line through New Westminister, B. C., to a point in South Vancouver call for electric operation.

A Lamp That Clamps Everywhere

The Adjusto-Lite is something quite new in lighting fixtures. It can be clamped firmly to any round or square projecting edge or rod—bed frame, table top, door, piano frame, automobile step—or can be rested flat on the table or floor. It is thus a general utility fixture. Light can be thrown in any direction desired by means of a hinge in the arm and a swivel in the shade holder. Manufactured by S. W. Farber, Brooklyn, N.Y.



Motor Driven Stucco Machine

A recent development is a motor-driven stucco machine by which the material is applied by projecting it from the machine by centrifugal force set up by the revolving spider blades. This machine is manufactured by the Hodges Stucco Machine Company, Cincinnati, Ohio, who state that by applying the stucco in this manner, a skin, or enamel, is formed, making an outside coating which is impervious to moisture. As an instance of the speed at which the machine works it is said that an operator with a helper to supply the material can project 550 square feet an hour against hollow tile, brickwork or concrete blocks, and a trifle less against such material as metal or wood lath. The equipment is light in weight, aluminum castings being used for the frame and tool steel for the revolving spider blades and automatic feed. The weight of the motor, therefore, represents the greater part of the total weight of the machine. An auxiliary hopper is provided by which pebbles, crushed granite and similar materials can be effectively thrown into the stucco base.

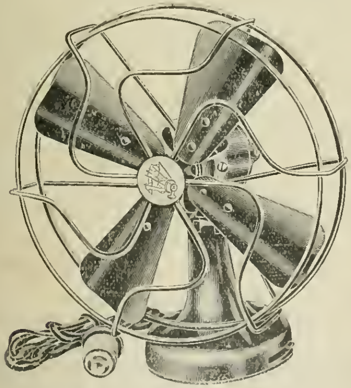
The International Electric Co., Ltd., Montreal, has been incorporated with a capital of $75,000, to acquire as a going concern the International Electric Co., Messrs. Phillippe DeSerres, Steven Dudemaine, Joseph Augustin Faguy, manufacturing electricians, Leonidas Cote and Wilfrid Boisvert, electricians, all of Montreal, all interested.

Keystone Car Specialties

The illustration herewith shows the "Safety" car lighting fixture made by the Electric Service Supplies Company, Philadelphia, and distributed in Canada by the Lyman Tube & Supply Company, Limited. An electric railway benefits proportionately as its service is improved. Better interior lighting means increased passenger comfort and, consequently, more passengers carried. The Electric Service Supplies Company manufacture a number of other electric railway specialties, including Faraday high voltage car signal systems, Golden Glow headlights, illuminated destination signs, trolley retrievers, motormen's and conductors' seats, and so on.

Polar Cub Electric Fans

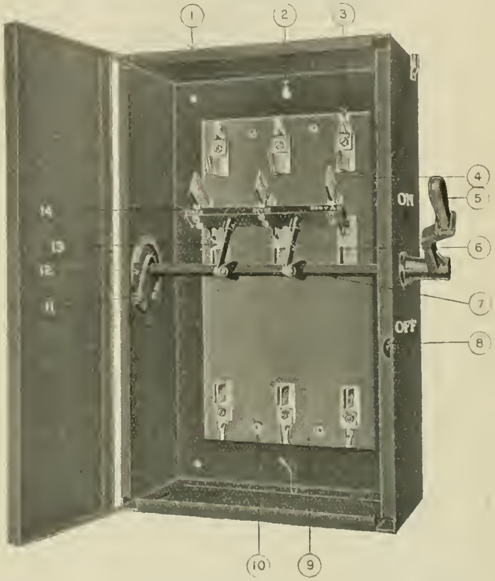
The Polar Cub Model D electric fan has the following selling features which are outlined by the distributors in Canada, the A. C. Gilbert-Menzies Company, Limited, Toronto: two speeds; die cast frame; guard spot welded; fan adjustable to any angle; motor nickel plated; mica filled commutator; easily lubricated; rust proof blades; equipped with 8 foot cord and plug; height 8 inches to top of guard, 6 inches to top of motor; guaranteed for one full season and packed in individual carton with attractive label. Another larger model, No. 9, is 10½ inches to top of guard and 7½ inches to top of motor, with blade diameter of 9 inches. Attractive window display material is furnished when requested, consisting of window stickers, store cards, folders, lithographed cutouts, and so on. The company state that the demand last year for Polar Cub fans more than exceeded the supply, and that the same is true to date this season.



The Bell Telephone Company will issue new capital stock to the extent of $1,500,000.

Safety Service Switches

The accompanying illustration shows the Devoe Type "A" externally operated safety service switch manufactured by the Devoe Electric Switch Company, Montreal. Several features in connection with this switch are outlined by the manufacturers. The moving arms are constructed in such a way as to give positive motion to the blades which all enter their contacts at the same time. With this construction there is no danger of a three phase motor running single phase or starting fuses being blown; a slotted screw hole is provided enabling one man to install the box; the base is of Monson slate; locking device to prevent switch from being closed; blades of 98% pure copper designed to make 90% contact; snap catch with hole for padlock; extra heavy cast iron handle; strong check preventing strain on switch when operating. All Devoe safety switches are examined and labelled under direction of the Hydro-electric Power Commission of Ontario.



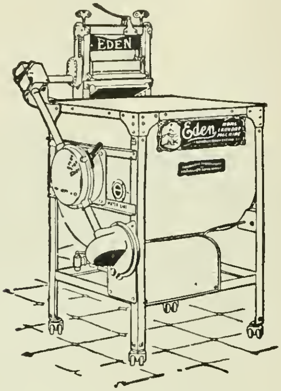
In connection with the reconstruction of the plant of the Saguenay Light & Power Co., Ha! Ha! Bay, P.Q., the order for the turbine has been awarded to the S. Morgan Smith Co., York, Pa. The unit is 800 h.p., the wheel being of the single horizontal type, 400 r.p.m., working under a 75 foot head. It is to be direct connected to the generator, and will replace an obsolete turbine. This power, in No. 2 power house, will be in parallel with No. 1 power, and the current will be for use at the mill of Ha! Ha! Bay Sulphite Co. and at the wharf terminals. The order includes a length of steel plate penstock.

Trade Publication

Fans, Blowers and Exhausters Catalog No. 400, by the Buffalo Forge Company, Buffalo, N.Y. It is pointed out by the company that the greatly increased use of fans in manufacturing and chemical plants for a great variety of purposes, together with the demand for greater efficiency, has led to the development of the new types and improvements illustrated and described in this catalog. The booklet also contains a quantity of data and information of use to all fan users.

The Eden Electric Washer

Wide-awake dealers are coming to realize that the way of the electric clothes washer into the home is greatly facilitated by the ever-increasing use of the smaller appliances. Every time you sell a toaster, an iron or a vacuum cleaner you secure a prospect who may, sooner or later, be interested in electric washing. Especially now that the hot summer months are upon us any relief from the drudgery of wash-day will instinctively appeal to the housekeeper. The washer illustrated herewith is manufactured by the Great West Electric Company, Limited, Winnipeg, and is called the "Eden." The company state it is a first grade machine assuring good profits for the dealer.



Current News and Notes

Brockville, Ont.

The Brockville Public Utilities Commission are endeavoring to secure the electrification of the Brockville and Westport branch of the Canadian Government railways, about forty-five miles in all and serving a rich farming district.

Bronte, Ont.

A by-law authorizing an expenditure of $6,000 for the installation of an electric lighting system was recently passed by the ratepayers of Bronte, Ont.

Camrose, Alta.

The ratepayers of Camrose, Alta., will shortly vote on the expenditure of $17,000 for the purchase of new machinery for the local lighting plant.

Chatham, Ont.

The Ontario Hydro-electric Power Commission has recommended to the city council that they take over the plant of the Chatham Gas Company who generate the power used in that city.

Hamilton, Ont.

The style of Moncur & Cook, electrical dealers, Hamilton, Ont., has been changed to The James Moncur Electrical Company.

Hull, Que.

An increase of three cents an hour and a nine-hour day has been granted to employees of the Hull Electric Railway by a board of conciliation.

Montreal, Que.

The International Electric Company, Montreal, have been granted a charter.

Ottawa, Ont.

The Spardon Electrical Products Company, Limited, Ottawa, Ont., have been granted a Dominion charter.

Parry Sound, Ont.

A by-law authorizing an issue of $165,000 in 6 per cent. debentures, for extending the municipal hydro-electric plant, was passed by the ratepayers on June 2nd.

Peterboro, Ont.

The city council of Peterboro, Ont., have approved the street railway's request for a straight five-cent fare which will henceforth be charged excepting during the morning and evening rush hours. The company has undertaken to improve the service.

Two new one-man cars have been placed in operation on the Peterboro street railway.

Regina, Sask.

Three hundred old style arc lights in the city of Regina will be changed for 400 c.p. nitrogen lamps.

The Northern Electric Company propose moving their western headquarters from Winnipeg to Regina.

St. Thomas.

The ratepayers of St. Thomas, Ont., have authorized an expenditure of $45,000 for improvements to the street railway.

Swift Current, Sask.

The power plant at Swift Current, Sask., was destroyed by fire recently. It was a Deisel installation valued at about $80,000. The engines, it is thought, can be repaired although the rest of the equipment is a total loss.

Thorold, Ont.

The Hydro-electric Power Commission of Ontario are preparing a valuation of the 28 miles of railway in the Windsor, Sarnia, and Ford City district owned by the Detroit United Railways, with a view to purchasing.

Westinghouse Promotions

Mr. N. S. Braden was elected third vice-president at the regular meeting of the board of directors of the Canadian Westinghouse Company, held June 4th, and at the same time Mr. H. M. Bostwick was appointed manager of sales. Mr. Braden, who has been manager of sales since the organization of the company, will in his new office have executive charge of the company's commercial organization. He has just returned from a six weeks trip to the Coast. Mr. Bostwick, who has been in intimate relation with all phases of the sales department and latterly has held the office of assistant manager of sales, will take over the direction of the sales forces and the conduct of the department in all its ordinary activities.

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Generation, Transmission and Application of Electricity

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The Electric Industry Weak in the Selling End

At the recent Niagara Falls convention of Ontario municipal engineers, Mr. Goodwin emphasized again and again that "The great problem of the electrical industry of the future is the commercial problem." The engineering problems are being taken care of satisfactorily, the manufacturing problems, the supply and distribution of current, but when it comes to the selling end as regards appliances and devices generally used by the consuming public, the industry is weak.

This fact must now be recognized by anyone who has studied the situation at all closely. Electrical merchants, as a class, do not exist. There is nothing in our industry that corresponds to the retailers in the shoe industry, or the grocer, the hardware store or the druggist, each of which is an old established "custom," so to speak. The people look upon these stores as necessities and the fact of this long existence has created a class of men who are skilled in handling this retail business. In the electrical retail trade there has been no time to train salesmen and the public have not yet come to look upon electrical appliances except as luxuries.

Here then is the problem of the industry—of the manufacturer, the jobber and the central station. An electrical merchant class must be built up. It is useless to hope that this class will spring into existence of its own accord. Even if it would, the process would take years and in the meantime the industry—and the public—would suffer.

Having admitted then that the problem of the industry is the commercial problem, that more electrical goods must be sold, many times more; we find ourselves face to face with the problem—how? There is the real problem. How can we establish electrical stores? How can we equip these stores with efficient salesmen who understand merchandising? Who is going to accept the responsibility?

Standard of C.M.A. Officers Temporarily at Low Ebb

The general public, having become accustomed in past years to respect the utterances of the Canadian Manufacturers' Association as the result of the prominent connection with this association of such names as Senator Frederic Nicholls, Mr. W. K. McNaught, C.M.G., Mr. W. H. Rowley, Hon. Nathaniel Currie, Sir Chas. Gordon, Mr. Lloyd Harris, Mr. Robert Hobson, Hon. C. C. Ballantyne and others scarcely less prominent industrial figures, must have noted with considerable disappointment the recent explosion of one of the members at the annual convention, in which he made use of language not generally accepted, to say the least, as forming part of a gentleman's vocabulary. That the president of the association, Mr. W. J. Bulman, an insignificant Winnipeg manufacturer, sat quietly by and allowed the members to proceed, makes him equally responsible. The incident doubtless is without significance in itself beyond the fact that it indicates that the standard of C.M.A. officials is, temporarily we hope, at a very low ebb.

The Canadian Manufacturers' Association is an organization on whose shoulders grave responsibilities regarding the industrial development of our country rest. We do not believe the members of that association, even a small fraction of them, are favorable to the use of such unbridled and offensive utterances as those made by this Mr. Harris on the occasion referred to. If the Canadian Manufacturers' Association is to become an arena for such disgraceful brawls as the recent demonstration of this man's boorishness, the influence of the organization cannot fail to deteriorate very rapidly from the high standard of past years.

Definite Policy on Naval Defence is Suggested

The proposed visit of Admiral Lord Jellicoe to this country is made the occasion of a strong plea in the June issue of "The Sailor" for a definite policy on naval defence and, as a basis of argument, the following policy is suggested:

That Canada and the other Dominions should take over the responsibility of protecting trade and sea communications of the Empire in time of war and subordinate their naval programmes to that function entirely; and that Great Britain should retain the responsibility of maintaining the battle-fleet, with its proper accompaniment of cruisers, etc., necessary to uphold whatever world policy the Empire decides is proper.

The article states that this policy, like all other policies, is open to certain objections, but it is believed that the advantages more than outweigh the criticisms that can be made against it. These advantages are summed up somewhat as follows:

1. The purely **defensive** characteristics of the arrangement. It cannot be contended that such a policy is militaristic or aggressive in design. It has been clearly stated in the words of the most responsible advocates of the League of Nations that such an instrument cannot be expected to end all wars, consequently, if the Empire is to exist, proper defence measures **must** be taken, that is, if we are to be at the same time worthy heirs to the heroes who built and left

us our precious heritage, and unimpeachable trustees for our successors.

2. The inter-dependence which such an arrangement involves between the component parts of the Empire will form a material bond far stronger than sentiment and Imperialistic speeches. Co-ordinated action in the matter of defence will do more than anything else to counteract the centrifugal tendencies of peace conditions, which are perhaps as much, or even more, due to the insidious propaganda of outside parties interested in the disruption of the Empire, than to any really conflicting interests born of trade rivalries or national aspirations.

3. The ease with which the machinery for defence can be manipulated in case of war or emergency, when each unit has its allotted task beforehand, instead of having to compromise between the conflicting requirements of Maritime defence.

4. The independence of action of each Dominion Navy under its own administrative heads, thus relieving the Admiralty of one of its most serious responsibilities. Interchange of individual vessels or of divisions, throughout the Empire in peace time is advocated in order to encourage uniformity of system and mutual understanding.

5. Economy in expenditure owing to concentration of effort, also greater efficiency resulting from concentrated study on particular spheres of Naval action and consequent expert knowledge.

6. And by no means least, the moral effect in time of peace of showing the flag of the Empire in all the waters of the globe co-operating in an organized system of defence.

Causes of Accidents

The 1918 report of the Workmen's Compensation Board of the province of Ontario has just been issued and shows, under the heading "Causes of Accidents, 1917," that "electric currents" were responsible for 81 cases, including medical aid, compensation, permanent disability and death. The total of all other classes of accident was 25,265. The report points out that primary causes of accident alone are possible of tabulation; secondary causes, such as bad lighting and so on, are not susceptible to tabulation, unfortunately, for they are often the train of circumstances leading up to the actual accident and are of greater importance from a prevention point of view than the primary cause itself. The Board also state that the employer's responsibility in cases of non-mechanical accidents is perhaps greater than he is willing to admit and even greater than he thinks it is. If a workman slips and falls it seems hard to charge the employer as responsible, but the condition of lighting might be directly responsible for the accident. The Bulletin of the Industrial Commission of Wisconsin is quoted as follows: "The statement has been made numerous times that of 500,000 avoidable accidents annually, 125,000 may be attributed directly or indirectly to poor lighting. While definite statistical proof of this statement is lacking, it is believed to be a conservative estimate."

Victory Year—Canadian National Exhibition

This year will be Victory year at the annual Canadian National Exhibition, to be held in Toronto, August 23 to September 6 inclusive, and, even though during the war this big event continued to grow better and brighter each year, the present year is certain to eclipse anything that has gone before. The confidence inspired by our success in the war, together with the signing of peace which will almost be a matter of history by that time, makes this prediction conservative.

The advance lithographed hanger, which is just being distributed, is one of the most attractive ever issued by the C. N. E. management. The prevailing colors are red, white and blue. Miss Canada is shown astride a powerful horse, holding aloft the Union Jack, and, standing beside her, a stalwart, khaki-clad Canadian soldier.

The exhibition will be opened by H.R.H. the Prince of Wales, and, among the many attractions, the following are noted: Grenadier Guards Band; Surrendered German U-boat; Canada's Official War Trophies; Canadian War Memorial Paintings; Mammoth Live Stock Show; Tractors; Acres of Manufacturers' Exhibits; Government Exhibits and demonstrations; Four Days of Motor Boat Racing, with Mile-a-Minute Boats; Poultry, Dog and Cat Shows; International Photographic Salon. The Grandstand performance will be called "The Festival of Triumph" and will, it is said, be the most gorgeous spectacle ever produced. Scores of other attractions will help to make Victory Year a record-breaker.

Must Have Provincial Charter

It has been debated in various provinces in Canada whether a company operating under a Dominion charter could be required by law to take out a provincial charter. The Supreme Court of Canada has handed down a judgment deciding in favor of the provinces, which means that a Dominion company can be compelled to bring itself under a provincial companies' act as a condition of carrying on business in the province. The effect of the decision appears to be to make a Dominion charter valueless for practical purposes in those provinces which require such companies to take out a provincial license. The decision would appear to apply to all classes of Dominion companies, including insurance companies. The provinces requiring provincial licensing are Ontario, Manitoba, Saskatchewan, British Columbia and New Brunswick.

National Electrical Code Correction

In the 1915 edition of the National Electrical Code the second paragraph of Rule 23, section "a" read as follows:

> "Where the switch required by No. 24 'a' is inside the building, the cutout required by this section must be placed so as to protect it, unless the switch is of the knife blade type and is enclosed in an approved box or cabinet, under which conditions the switch may be placed between the source of the supply and the cutout."

Through an error this section was omitted when the 1918 edition was printed.

The Electrical Committee of the National Fire Protection Association has voted that this matter be given the widest publicity, that all interested parties may be advised that this section was omitted. The Electrical Committee would recommend that Inspection departments approve an installation in accordance with this paragraph.

Canadians at N.E.L.A. Convention

A number of Canadians attended the recent convention of the National Electric Light Association including Arthur Doddridge, Quebec Electric Company; F. G. Clarke, Toronto Power Company; R. S. Kelsch, Montreal; Geo. D. Leacock, Moloney Electric Company; L. G. Ireland, Ontario Hydro Commission; C. C. Bothwell, Canadian Laco-Philips Company; A. A. Dion, Ottawa Electric Company; Wills Maclachlan, Toronto and D. H. McDougall, manager Toronto Electric Light Company.

The great problem of the electrical industry of the future is the commercial problem.—W. L. Goodwin.

Municipal Electrical Engineers Hold Successful Convention

Characteristic Addresses by Mr. A. Monro Grier, K. C., Mr. W. L. Goodwin and Mr. Samuel Chase—Papers Presented by Mr. R. C. McCollum and Mr. C. E. Schwenger—Name Changed to "Association of Municipal Electrical Utilities"

The Association of Municipal Electrical Engineers held another successful convention at the Clifton House, Niagara Falls, on June 19, 20 and 21. The program, as previously announced, was followed according to schedule, largely due to the fact that precautions had been taken to prevent overcrowding. The convention proper consisted of interesting papers by Mr. R. C. McCollum and Mr. C. E. Schwenger, and addresses by Mr. A. Monro Grier, K.C., Mr. W. L. Goodwin and Mr. Samuel A. Chase. The greater part of the first day, however, was taken up with a discussion of certain changes in the Constitution and with the presentation of committee reports.

It was decided to change the name of the organization to "The Association of Municipal Electrical Utilities."

Report of Committee on "Bare vs. Weatherproof Covered Wires, for Potentials Above 750 Volts"

You will remember that at the January meeting of this Association, the excellent paper by Mr. A. S. L. Barnes on the above subject, provided a very interesting and profitable discussion. Owing to the somewhat limited amount of time then available and with a view to bringing out additional information, it was felt that the practical side of the question should receive still more attention and discussion. A committee was therefore appointed by ex-president Buchanan for the purpose of obtaining the opinions of experienced outside construction and maintenance men, as to the relative merits of the "Bare vs. Weatherproof Covered Wire," for potentials above 750 volts. The committee appointed consisted of John H. Heeg, Guelph; T. E. Bell, Mimico; C. W. Alford, London; J. W. Cook, New Toronto, and the writer.

As it was desirable to reach as many as possible of these qualified to express an opinion, it was decided that a circular letter, with a question form, was the best method of obtaining the desired results. The questions submitted were as follows:—

(1) Considered from the standpoint of safety to life, is weatherproof line wire safer than bare wire for general distribution on voltages over 750;

(2) If so, at what voltage is a covering of no value?

(3) Is weatherproof wire any advantage from an operating standpoint, as regards crosses, grounds, or freedom from foreign wire troubles?

(4) Are you in favor of it being abolished entirely for line work for voltages over 750?

As "Safety to life" and "Continuity of service," are possibly the two most important factors from a practical man's standpoint, the question, you will notice, covered these points only.

In all, 128 inquiries were sent out and a total of 65 answers received. The replies have been tabulated as follows: From hydro municipalities, 45; from other municipalities, 9; other public service corporations, 11.

(1) In favor of weatherproof insulation from safety to life standpoint—Hydro, 39; Municipal, 5; Company, 11; total, 55, out of 65.

Not in favor of weatherproof:—Hydro, 6; municipal, 4; total, 10; out of 65.

(2) Voltage limit for weatherproof—750 volt, 7; 1100 volt, 36; 2200 volt, 21; 4400 volt, 17; total, 48.

(3) Advantage of weatherproof from operating standpoint—covered by question No. 1.

(4) In favor of abolishing weatherproof for voltages over 750, 10.

It will be noticed that of the eleven companies that have reported, none are in favor of the bare.

Many instances were cited in replies received of the value of the covered, as against the bare wire, and also several suggestions that weatherproof insulation be improved in quality and durability, but time and space will not permit of taking up these matters at this time.

In conclusion, it would seem that weatherproof covering for voltages over 750 is still in greater favor than the bare with men responsible for the construction and maintenance of overhead distribution systems in municipalities other than rural.

(Signed) R. H. Martindale.

Inspection Fees too High

Following a discussion of the inspection fees charged by the government, the following resolution, moved by Mr. McHenry, seconded by Mr. Buchanan, carried:

"That, whereas the Inspection Act under Clause 27 in regard to the regulation of fees for the testing of electrical meters states that such fees shall be so apportioned that they will as nearly as possible meet the actual cost of effectually carrying on such inspection.

And, whereas the report of the Inland Revenue Department shows that in the past nine years there is a net surplus from inspection of electric meters amounting to $238,773.29.

And, whereas the rates now in force were designed some years ago, when conditions were vastly different from those existing at present, and as there will be an ever-increasing use of electric meters with consequent re-inspection of same,

Therefore, be it resolved that in the opinion of the Association of Municipal Electrical Utilities of Ontario the present inspection fees are much too high, and this Association therefore petitions the Department of Trade and Commerce to give the question of reduction in the rates for electrical meter inspection, serious consideration, and to effect such reduction in keeping with the intent of the Inspection Act.

Display of Labor-Saving Devices

An interesting feature of the convention this year was the manufacturers' exhibit. The display of labor-saving devices was particularly appropriate in view of the prevailing hot weather during June this year, consisting as it did, of all those household devices which make for comfort and efficiency. Among the exhibitors were: Canadian General Electric Company; Canadian Westinghouse Company; Acme Stamping & Tool Works; Canadian Porcelain Company; Hoover Suction Sweeper Company; Hughes Electric Heating Company; Hurley Machine Company; Jefferson Glass Company; Lowe-Martin, Limited; Majestic Electric Company; the McClary Company; Moffat Stove Company; National Electric Heating Company; 1900 Washer Company; Northern Electric Company; Packard Electric Company; Renfrew Electric Company, and Sangamo Electric Company of Canada.

The Convention Dinner

The dinner on Thursday evening was a most enjoyable affair and the all-too-brief address of Mr. A. Monro Grier, K.C., gave the delegates one of the most delightful hours of the convention. The speaker announced his pleasure at being present at the banquet as the guest of the municipal engineers, expressed his feeling of good will and good fellowship towards any body of men associated with the industry in which he himself was so vitally interested and, as one who had been associated for many years with the greater development of Niagara power for the use of the province of Ontario, welcomed them to Niagara Falls. His address will be given in greater detail in a later issue.

The Goodwin Plan

On Friday morning Mr. Chase and Mr. Goodwin both addressed the convention. Mr. Chase urged the adoption of his slogan: "Live and Help Live," as a more modern interpretation of the attitude of mind of capital and employer towards employees and customers. Mr. Goodwin covered much of the old ground and opened up to his hearers a vision of a better era in electrical merchandising when the various sections of the industry—manufacturer, jobber, central station and contractor-dealer—shall have merged their identities into one vast force working for the good of the consumer through the more intensive cultivation of the field for labor-saving devices. Mr. Goodwin, always a forceful and convincing speaker, excelled himself on this occasion. In our next issue a fuller report of the addresses of both Mr. Chase and Mr. Goodwin will be printed.

Routine Handling of Consumers' Accounts

By Mr. R. C. McCollum*

In planning a system for handling consumers' accounts of a Hydro Electric Utility, there are several principles of so outstanding a nature that they must be recognized and the system built around them. Briefly, they might be given the following relative importance:—

1st—The record should be concise, but in sufficient detail that any error in the monthly bill can be promptly detected, or any complaint of a customer can be intelligently discussed without going back to the meter card or any other record.

2nd.—It should occupy the minimum office space and in its operation be as noiseless as possible.

3rd.—It should be accessible to any number of clerks at the same time.

4th.—The index should be rapid and definite and should provide for unlimited expansion.

5th.—It is especially desirable that when used in Hydro offices where a uniform system of rates is in force throughout the Province, the forms should be uniform, to secure the greatest measure of ecenomy in installation and renewals.

6th.—It should be possible to examine the charges for any particular class of service without disturbing the balance of the accounts.

7th.—The records should be so kept that representatives of the Hydro Electric Power Commission can, in the minimum time, extract from them such information as is necessary from time to time, to check the actual working out of rates and modifications of same as is required by the provisions of the Power Commission Act.

A careful survey of the situation and a study of the practice of public service corporations here and in the United States lead to the selection of a card system as most nearly measuring up to the requirements and so far as I know there are but three Hydro municipalities in the Province of Ontario, where the card system has not been adopted. This does not include municipalities connected to the Central Ontario system in most of which registers are still in use.

The adaptability of card records to the requirements generally, will be admitted by all who have used them. Under the old system of rates, consisting of a straight kw.h. charge with possibly a fixed meter rental, the old fashioned register, though clumsy, answered the purpose. It required the exclusive use of a large desk and could be worked on by but one clerk at a time. If, as was usually the case, every alternate line was left blank to accommodate new accounts, the register was extravagant in the use of paper and the number of leaves which had to be turned in posting. It also had to be re-written each year, a task looked forward to with dread from about vacation time. As a rule all the information it contained was the gross and net charge, and date of payment, and the only way the billing and extension could be audited, was by checking back to the meter records something that in practice was rarely if ever done.

Card Ledger Gives Much Information

A card ledger, properly kept, can be made to give an amazing amount of information. The color scheme generally used, shows readily the number of domestic light, commercial light and power services. By the use of an offset or a tumble card, the daily postings, both debits and credits, can be check posted, and, where a control account is kept, the office can be closed each night with that satisfaction, so dear to every real bookkeeper, of knowing that his accounts are in balance. Where the cash is check posted to the cards, as is usually done, without the use of a control account, these tumble cards can be used to indicate debit balances, so that a manager can run his eye over his card trays any day in the month and pick out every account in arrears, without examining or even touching another card in the tray.

The average manager of a Hydro system will admit that the matter of arrears is about the least of his troubles. It is not at all unusual for records to show not over two or three per cent of accounts in arrears,—and I have one municipality in mind where for three consecutive years the books have been closed without a single account in default. Such conditions could never obtain where managers had to pore through hundreds of pages of ledger or register to draw off delinquent lists.

It is the universal practice in even the smallest municipalities to keep the consumers' accounts in meter reading route order. The advantages of this are too obvious to need explanation, but there is much difference of opinion as to just how far this system should be elaborated.

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*Auditor Municipal Accounts, Hydro-Electric Power Commission of Ontario.

With the exception of a few of the very largest municipalities, it was the practice, until quite recently, to send the months' bills out at one time, approximately the first of the month, with a uniform discount date thus crowding into about fifteen feverish days the work that should have been spread over the entire month. About the only advantage of this plan was the impression which was conveyed to the citizens who usually called at the office each month on "fever" day to pay their bills, that it was the busiest and best organized office in the town, an impression usually very far from the truth. It is with these two phases of office routine that I wish to deal.

Continuous Billing in Larger Municipalities

In all municipalities large enough to require the services of a meter reader for over six days a month, continuous billing should be inaugurated, and an arrangement of cards and numbering adopted to facilitate this plan.

Where the meters can be read by one man in less than a week, a fixed billing and discount date is probably the best plan. All that is necessary is to make out a meter card for each consumer and have the meter reader, assisted by someone who knows the town thoroughly, number the cards from one up, in the order in which they will ordinarily be reached, leaving blanks for vacant or unwired houses, vacant lots, or any district where additional accounts are likely to develop. Another plan is to leave every second or third number blank, according to the district, alternating from odd to even numbers, so as to use approximately the same number of cards of each tab. Either of these plans will work satisfactorily, if plenty of blanks are left, and blank numbers cost nothing. Our experience has been that when the cards are rewritten at the end of two years, the re-numbering at that time is practically permanent. A large number of excess blanks is preferable to the use of fractional numbers or an initial affix.

In larger municipalities where continuous billing is advisable, the area should be divided into from ten to twenty-five districts, according to the size of the city. This can best be done by marking off on a large scale map, in colored ink the districts decided on. This should be very carefully done, commencing in the centre of the city and working out, making each district small enough that the meter reader ordinarily can cover it in three-quarters of his working day, leaving a comfortable margin to take care of pick-ups, re-check apparent errors, and catch up delays due to holidays, sickness or accident.

Where it is proposed to have the meter reader deliver the bills, and the districts are made small enough to be read in the forenoon, it is quite practicable to have the bills delivered in each district on the afternoon of the day following the reading, and the pick ups taken care of at the same time.

With the possible exception of the main business streets or where for lack of paving the meter readers are unable at certain seasons of the year to cross at will, it will be found best to draw the district lines on the map so as clearly to include or exclude the street. There need, of course, be no outside limit to the last row of districts which extend to the present city limits.

On the map, each district should be numbered boldly in the centre. Each street in each district should be given a sub-number, commencing at No. 1, as nearly as possible in the order in which the meter reader will reach them. No attempt should be made to give one street the same number in two or more districts unless the numbers fall naturally.

With the aid of a city directory you can now, if desired, mark on the map the house numbers at the district intersection of each street, or this information can be placed in a small card index in the following form for each street and filed alphabetically:

Queen Street	District	Street
1—137	1	1
139—230	3	2
231—End	7	4

As each consumer is given a permanent number consisting of his district, street and house number, when Mr. Smith signs an application and contract and gives his address as 87 Queen Street, you immediately register his contract and ledger card 1-1-87 with no fear of duplication or conflicting numbers. Of course the number belongs to the house or service and will pass to Mr. Smith's successor if he should vacate.

The contracts are naturally filed alphabetically and afford a perfect index to the ledger account at all times, but in actual practice it will be found that the customer who mislays or forgets his bill can usually remember where he lives and with this information the clerk can find his ledger card in the tray in less time than the contract or index card in the alphabetical tray can be located.

This system is permanent and perpetual, and allows of unlimited expansion. The only difficulty to be encountered is business blocks and apartment houses, which if small, can be keyed alphabetically, or if large, can be given a number same as a street, which is practically what they are.

The great problem of the electrical industry of the future is the commercial problem.—W. L. Goodwin.

An Uncertain System

Of course there are other ways of securing meter readings. I recall our first visit to a large Hydro city where they were getting along without any meter cards. The consumers' accounts were kept in loose leaf ledgers, one name to a sheet, and they well nigh filled a room. Each day a clerk went through a section of these ledgers and wrote on little slips about three inches square the name and address of the consumers whose meters were due for reading, and these slips were handed to the meter readers. The next morning the meter readers turned in all the slips which they hadn't lost, with the readings, and it was the duty of the office boy to put these slips back in the ledgers beside the customers' account, leaving one end protruding as a marker. Then the billing clerks made out bills for all the accounts so marked, and charged the ledger account accordingly. If the office boy lost the slip, or shoved it in too far, or if it fell out, or if the meter was in the attic, or the customer kept a cross dog,—no bill went out for another month. Hundreds of customers were not billed for periods running from six months to a year, and as with such a system no follow-up scheme was possible, the ledgers contained literally thousands of dollars worth of bad accounts which were finally written off as uncollectable.

Various styles of billing forms are in use, the size and form varying according to the personal preference of local officials. A standard form is stocked by the commission and is used generally by the smaller municipalities, but in towns and cities the bills should of course be printed locally, and should carry the address and office hours. Where the bills are sent out at one time, a vast amount of writing can be saved by having the printer set in the date and discount period, changing the month when approximately a month's supply is run off. A few extra bills left over each month is a small matter, and a shortage can be made up from extra blanks, and in addition to the saving in writing, the bills present a neat and businesslike appearance. In some offices it is the practice to alternate the colors each month, a plan which does not cost anything and very frequently prevents the inadvertent allowance of discount on a last month's bill.

In all offices where there are one thousand or more customers the bills should be numbered and addressed with an addressograph or some similar device.

With such a machine a clerk in a few hours will do with neatness and accuracy work that would otherwise require days of laborious copying.

The fact that bills are headed for every account is a constant check against record cards being out of the cabinet, and insures against errors in address. Where bills are sent through the mails, the address should be so placed that window envelopes can be used. A perforated envelope costs about half as much as one with a transparency, and is much more efficient.

Stub and Bill in One Operation

When addressing machines were first introduced, the saving in time and labor was so great that it was considered no hardship to make the same impression on both the bill and stub,—but we now find that by placing the account number at the right of the address, so that it will fall on the stub, and the name and address on the body of the bill, a single impression is all that is necessary, thus affecting a further saving in this work of approximately 30 per cent.

Bills with perforated stubs should be so prepared that the figures on the stub will be placed on the extreme left, immediately adjoining those on the bill itself, so that both sets of figures are visible without changing the focus of the eye. This will practically eliminate transposition of figures, and ensure the stub carrying the same figures as the bill. Errors in stubs have caused many an hour's work with a cash drawer that would not balance.

It is generally admitted that a running detailed record of cash receipts should be kept in every well organized office, although in many offices the stubs are simply run through an adding machine after posting, and filed with the listing slips wrapped around them. I have had considerable experience balancing ledgers where this practice was followed, and where so many bills are for the same amount the slips are of no use in checking, even when they can be found. I consider the practice slovenly and altogether undesirable. The daily listing of the stubs in a cash book, using the account numbers instead of the names, is not a formidable undertaking and leaves a record for the municipal auditor of which the manager need not be ashamed.

By using a split adding machine, the cash book may be entirely prepared mechanically and added at the same time. A single split will give all the information necessary, even where a complex account number is used, by placing the district number at the head of each list on the non-add side. Such cash books are in use in a large number of municipalities and are giving general satisfaction, affording a neat, concise record in a very limited space.

In one police village an enthusiastic trustee undertook to do all the clerical work himself, and when we called at the end of the year to close the books, we were handed the meter book and the pass book. In this case it was actually necessary to call on every customer in the village and examine their receipted bills in order to secure data on which to build up a cash book.

The foregoing outlines the plan of handling consumers' accounts which in whole or in part is in use in every Hydro municipality in Ontario. In general efficiency I feel it is the equal of any system in general use, and that the average cost is at least fifty per cent. less than that of public service utilities using cumbersome ledgers or registers and passing the charges and collections through a control account which, in many cases, is thousands of dollars out of balance, and where, after the adoption of continuous billing, the proof of balance is practically impossible. I have in mind two Hydro municipalities where the accounts were regularly audited by chartered accountants of recognized standing, but who made no effort to justify the control account although in one case it was known to be over three thousand dollars out of balance—also another city where the five billing districts were handled through five separate control accounts, and where one clerk was assigned exclusively to keeping these accounts straight although there was practically no possibility of any actual shortage in the cash which such a check could detect as the collections were made in another office,—and of still another case where an auditor was paid a special fee of $2,[illegible]00.00 to re-check his previous work and locate discrepancies in the control account amounting to $3,500.00, although in this case also there was no thought of locating any missing cash or increasing the revenue.

It seems a far cry back to the early days of Hydro when one manager made his collections personally, entering them in a loose leaf pocket memo which he destroyed as soon as the items were posted in his ledger. It was the most satisfactory customers' ledger I ever saw, as every account was kept balanced by the simple expedient of never making any charges until the collection was entered. As it was a flat rate town with no meters, and the manager varied his charges from month to month according to the amount he thought they ought to pay, there wasn't much work for the auditor unless something had destroyed his faith in his fellowman. I also recall two other municipalities where the secretary kept an ordinary receipt book on his desk, and carefully filled one out for each customer, completing the stub for his own record.

Operation of Overhead Distribution Systems

By Mr. C. E. Schwenger*

In this paper attention will be called to some of the more important details entering into the design and operation of overhead alternating current distribution systems, touching upon certain points with a view to bringing about a discussion which may result in arriving at conclusions of mutual benefit.

These will be brought forward under the following general headings:

(a). Secondary Lines.
(b). Transformers.
(c). Primary Lines.

Secondary Lines

Under secondary lines will be included all lines intended to supply service direct to apparatus on consumers' premises at voltage of 600 or less. Such apparatus includes motors, lighting and heating equipment.

For the purpose of this paper we shall consider parti-

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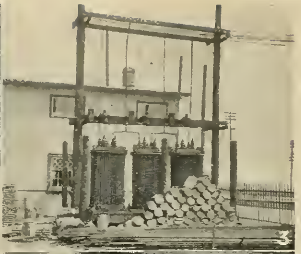
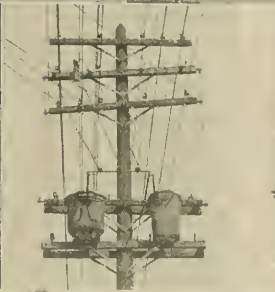
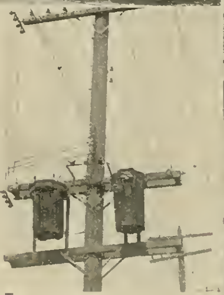
*Engineer of Distribution, Toronto Hydro-Electric System.







(1) Evenly distributed secondary, Browning Ave., East of Arundel; (2) 2200 volt cable on trees, Jarvis St., south of Bloor; (3) Bank of 3-200's on 4100, Ashbridges Bay, Villiers Street; (4) Bank of 2-50's, Richmond and Bay Streets; (5) Transformer Bank, Gerrard and Belhaven, double ground; (6) Transformers on 4100, Danforth and Eaton; (7) Detail of car for current and voltage readings; (8) Outfit for changing oil in transformers; (9) Evenly distributed primary, Dundas Street, east of McCaul; (10) Taking Current and Voltage readings; (11) Detail of outfit for changing oil in transformers.

cularly the supplying of lighting and heating appliance loads, as these loads require closer voltage regulation than motor loads.

In the matter of supplying lighting and household appliance loads, statistics show that a greater demand exists for 115 volt equipment, especially lamps, than for other ratings. Now if the supply at the socket is to be at 115 volts our secondary lines must operate at a somewhat higher voltage depending upon the amount of voltage drop which we shall allow. For this purpose let us allow 2% drop in secondary lines and 2% drop in consumer's wiring. We shall then find it necessary to maintain a voltage of approximately 120 volts during periods of greatest load on our secondaries.

For our secondary system we have the choice of 120 volt 2 wire single phase, 120/240 volt 3 wire single phase, and various combinations of polyphase connection.

The polyphase combinations are not generally used and will be omitted from this discussion.

For equal conditions as to load, voltage drop, and losses, the relative copper requirements by simple calculation, assuming 2 wire single phase line as 100% are as follows:

120 volt single phase, 2 wire—100%.

120/240 volts, single phase, 3 wire—37.5% (neutral equal to each outer).

120/240 volt, single phase, 3 wire—31.25% (neutral equal to one-half each outer.)

This shows decided economy in use of 3 wire system, having neutral wire one-half the size of each outer.

The problem of secondary lines usually resolves itself into one of two classes:—

(1).—Lines with supply at one end and the load concentrated at the other.

(2).—Lines with supply at one end and the load distributed from one end to the other.

The first problem lends itself to easy calculation as the factors entering same are well known. This problem in city distribution is not often encountered. However, in city distribution or in thickly settled communities the load is generally of the distributed type. These secondary lines are often tied together at each end and supplied from a common bus forming a network.

For the solution of this problem, in which we shall assume the load as evenly distributed, we must know the total load distributed over the line, and also the distance of furthest consumer from the bus or transformer. Having chosen the allowable drop between bus and furthest consumer, say at 2%, we then have an allowable drop 2.4 volts, total load say to 20 amps at 240 volts and distance say 750 feet. It is well known that for evenly distributed load

$$E = IR/2 \text{ or } R = 2E/I$$

where E = Allowable drop

I = Total load current

R = Total circuit resistance.

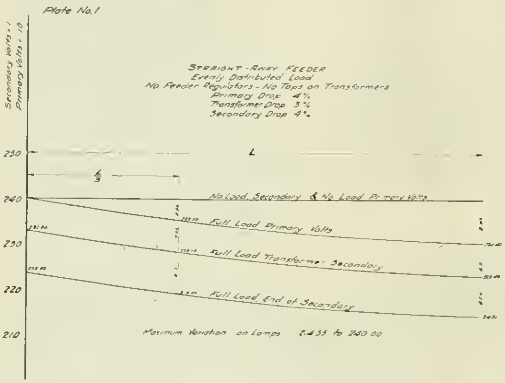
$$R = 2 \times 2.4/20 = .24 \text{ ohms.}$$

i. e. 1500 feet of wire = .24 ohms.

1000 feet of wire = .16 ohms, which corresponds to No. 2 wire.

Using this method convenient tables can be calculated.

In the matter of voltage regulation it is clear that due to line drop the lamps near the bus are operating at 2% higher voltage than those at the other end. If voltage regulators maintain constant voltage on lamps at the bus then lamps at other end operate on voltage varying 2% between full load and no load. This is also true for lamps at the bus end if constant voltage is maintained at the lamps at distant end. In the former case the distant lamps at the loaded period operate at a voltage 2% below normal and in the latter the lamps near bus operate at a voltage 2% below norter the lamps near bus operate at a voltage 2% above normal. However, if the regulators are adjusted to maintain constant voltage at lamps at a point between the bus and the distant end, so that on peak the rise in voltage of lamps at the bus equals the drop in voltage of lamps at distant end, then we shall find that with 2% difference in voltage between lamps at each end that the lamps at either end operate on voltage varying but 1% from normal, but in opposite directions. The point at which we should regulate to obtain this result is approximately one-third the distance from bus to other end.



Straightaway feeder curves—Evenly Distributed Load

Now if we are to allow a voltage change on the lamps on account of secondary drop of 2% it is evident that by using regulators adjusted for the one-third point we can use secondary conductors having twice the resistance found necessary for lines having constant voltage conditions at either end. Thus in the problem above we may use wire of .32 ohms per thousand feet. The nearest size corresponding to this is No. 5 wire, which has approximately one-half the weight of the No. 2 wire.

This gives an indication of the economy in secondary conductors made possible by the use of regulating equipment on our supply lines.

Transformers

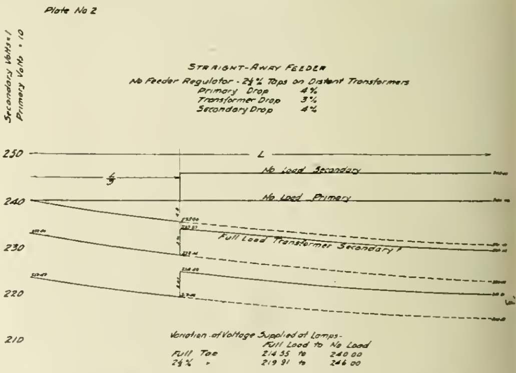
It is apparent that with a secondary system, such as just described it will be necessary at period of maximum load to maintain approximately 120 volts at the transformer. Therefore, if transformers are to have the standard ratio of 20 to 1 they should have a normal primary rating of 2400 volts.

Transformers should be provided with several percentage taps on the primary winding. The reason for this will be discussed under primary lines.

Transformers should be operated to carry at least full load during period of maximum load. This is necessary from a standpoint of efficiency and economy, for which no idle transformer capacity should be installed on the lines. For this unused capacity we are getting no revenue return with which to pay for the extra losses and capital investment charges such as interest, depreciation, etc. In addition to this there is capital tied up which might be put to more efficient use.

For the purpose of keeping the transformers loaded efficiently it is desirable that records and tests of maximum loadings be kept. This would enable us to see that no idle transformer capacity is installed, and also to avoid loading transformers to the danger point. In the case of transformers supplying power loads this is a comparatively simple matter as the number of consumers supplied from any one bank is small and connected load records are easily obtained. On account of heavy starting currents required on motors it is usually not advisable to carry in connected load more than about 150% of the rating of each power bank. This applies particularly to power banks rated under 75 kv.a. This is a rough rule. It is safer to check each bank by taking current readings at the maximum loaded periods, thus obtaining direct information.

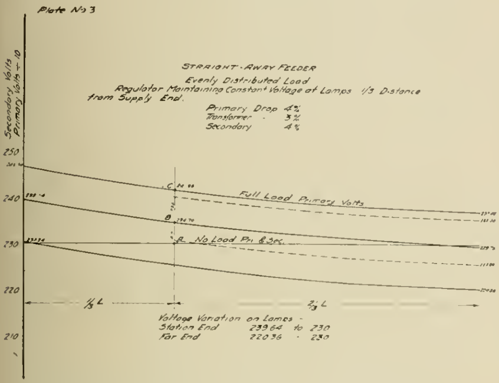
However, in the case of supply for lighting and heating appliances where transformers are operated in banks supplying a common bus and distributing network it becomes practically impossible to keep a useful up-to-date record of connected loads on account of the constantly changing large number of consumers, and of the varying load conditions of individual consumers. In this case a good check can be obtained by taking current readings on the transformers during the hours of maximum load. The writer finds that these readings should be taken about once per month during the winter months. The load in summer months is comparatively light, and, therefore, readings are not required. These readings are conveniently taken by using a so-called "line testing set" consisting of split core current transformer and ammeter. This gives us directly the actual load demands on each transformer. The maximum load which any transformer may carry depends upon the temperature at which the transformer operates. Transformers are usually designed by the makers to operate at full load continuously without exceeding 50 degrees C. rise in temperature when the surrounding temperature is 40 degrees C. This gives us the maximum temperature as 90 degrees C.



Straightaway feeder curves—2½ per cent. taps on distant transformers

Transformers on house lighting service operate at their maximum loads during the winter months when temperatures are low, usually below 0 degrees C. and also during the evening when the temperature is usually somewhat lower than in the daytime. In addition to this they carry their maximum load not more than four or five hours, and for the balance of the day the load is very light. From this it can be seen that in order to reach the high temperature for which they are designed transformers must operate at considerably more than full load during the hours of maximum load in the winter months. Under conditions of service such as this they can safely carry 50 per cent. overload without damage. Also during the long period when they carry little load they obtain an opportunity to cool down again to a comparatively low temperature.

In addition to information as to loading of the transformers these readings tell us how closely the loading is balanced on either side of the neutral. If the load is found to be unbalanced steps can easily be taken to reconnect service to bring about a balance. Connected load or consumers' demand records do not give us information on this point.



Straight-away feeder curves—Regulated at one-third distance

Where such records are relied upon there is a possibility of producing a heavy overload on one-half the transformer when connected for three wire operation and still not have a heavy total load on the transformer. There is, therefore, danger of burning out the transformer. Also if trouble develops on one side of the secondary system in the form of a short circuit well out from the transformer sufficient primary current may not flow to blow the primary fuse again producing a danger of a burn out.

When transformers supply three wire secondaries it is desirable to operate them connected for 10 volts, two in series across the outers. When so connected should the transformers on one side of the neutral blow their fuses due to any cause, only one-half of the transformer bank becomes inoperative as the other transformers will continue to supply service. Thus where two wire services are supplied but one-half the consumers are without light. When three wire services are supplied and these are becoming general particularly for store lighting, it follows that but one-half of each consumers' lights are out of commission, which is much less inconvenient than to have all lights out. The secondaries of transformers operating at 120 volts 3 wire must be grounded at the neutral point if three wire, and two wire one side must be grounded. For the purpose of grounding driven pipes at the side of the poles have formerly been largely used but these are found to be often of little use and are not recommended. Solid grounds should be installed. These are best obtained by connection to water mains or pipes, and if these are not available copper plates buried in coke should be used. These should be placed deep enough to lie in earth permanently moist.

All transformers should be protected by lightning arresters, placed on the same pole as the transformers. However, it is well to run a separate ground wire to the ground plate independent of the neutral grounding wire.

Primary Line

(c) Under primary lines will be included all lines intended to supply transformers having primary windings nominally rated at 2,400 volts. As to choice of such lines we have the following:

(1).—Single phase, 2 wire, 2400 volt.
(2).—Three phase, 3 wire, 2400 volt (delta connected.)
(3).—Three phase, 3 wire, 2400 volt (star connected).
(4).—Three phase, four wire, 2400 volt (star connected.)

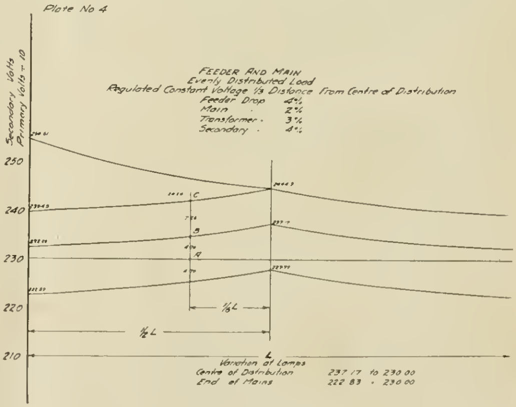
There is also the two phase 2400 volt system having either 3, 4 or 5 wires, but on account of this being now more or less obsolete it shall be omitted from this discussion.

Now let us take up the question from standpoint of copper requirements. Easy calculations show that for equal conditions as to load, voltage regulations and losses, and assuming the copper required for the single phase 2 wire lines as 100 per cent., the following obtains:

Table 1—System	Copper Required
2 wire single phase 2400 V.	100%
3 wire three phase, 2,400 V. (delta)	75%
3 wire three phase, 2400 V. (star)	25%
4 wire three phase, 2400 V. (star)	29.16%
	(neutral wire one-half outer)
4 wire three phase, 2400 V. (star)	33.33%
	(neutral wire same as outer)

This clearly shows advantages in the choice of one of the 2400 volt Star connected systems.

Again let us decide as to nature of secondary service to be supplied. It is desirable to supply mixed lighting and power loads from the same primary lines to avoid duplication of feeder equipment and lines, more so if the power loads are moderate and do not overlap the lighting loads to any great extent. This condition allows the feeder regulating equipment to care exclusively for lighting loads when operating at maximum load, without interference from power load surges so detrimental to good regulation. Where considerable power load only has to be taken care of unregulated three phase feeders should be run as motor loads do not require closely regulated service. A choice of feeder supplying exclusive power or mixed loads will, therefore, eliminate the choice of the single phase feeder leaving us the three phase systems.



Feeder and main curves

Where three phase power loads are to be supplied it is often desirable to connect two transformers in open delta on secondary side, thus making it possible at any time to close the delta with a third transformer should a larger power demand occur. The reverse, of course, is desirable also and it should be possible to continue service if one transformer (where three are used) becomes defective. This condition can be handled by the three wire three phase delta system and by the four wire three phase star system. This cannot, however, be supplied from the three wire star connected system.

Referring to the matter of regulating equipment required for lighting loads the three phase 4 wire system has decided advantages. With a single phase regulator on each phase wire this can be adjusted to act independently without interference through load condition on the other phases. The regulator action is quite stable and compares in this respect to the single phase feeder and regulator. This is not the case in regulating delta connected feeders where unbalancing of loads on the various phases cannot be so nicely taken care of. Changes of this kind usually effect all phases. Another feature which is in favor of the 4 wire star connected system is the fact that on account of the higher voltage between phase wires it is possible to transmit with equal sized conductors and with equal voltage drop any given load approximately three times the distance possible in the delta system. This is desirable where loads in suburban districts have to be handled.

The above considerations would lead us to the adoption of 4 wire star connected system.

Where a heavy secondary network is to be supplied the neutral wire of this can be used as a common neutral for the primary lines as well, thus saving an additional wire and giving us the economy in copper of the 2400 volt 3 wire star connected system.

As in the case of secondary lines the problem resolves itself into the two general classes:

(1).—Lines with load concentrated at the end.

(2).—Lines with load distributed from one end to the other.

The distributed form of load is more commonly encountered, and for the purpose of this discussion we will assume that the load is evenly distributed.

For the supply of such loads we have two general schemes of primary layout, namely the straightaway feeder with small branches and the centre of distribution or "feeder and main" system.

In the straightaway feeder loads are taken off along the line while in the feeder and main types the feeder is run to a centre of distribution at the centre of the load and mains are run in all directions from this centre. No loads are taken off the feeder between the station and the centre of distribution but are all taken off the mains.

Let us assume a case of feeder of length "L" with load evenly distributed along its whole length. The total load in amperes=I. Consider but one wire of length "L" having resistance R.

Then for evenly distributed load the drop $E = IR/2$ or $R = 2E/I$.

Now compare this with a feeder and main where the feeder is run to a point L/2 from the station and two mains are run one back to the station and one to distant end L. Suppose we wish to use same amount of copper as in straightaway line we then have feeder of resistance = R/2 and two mains together of length "L" whose weight is the same as feeder whose length is L/2 and resistance R/2.

Now weight of conductor = constant x $\text{length}^2/\text{Resistance}$.

Then weight of straightaway conductor = Constant × L^2/R and weight of Feeder in "Feeder Main" = ½ this or $L^2/2R \times$ constant.

The mains are of length "L" and of same weight as the feeder or = Constant × $L^2/2R$.

Therefore the mains of length "L" have resistance "2 R" or each main of length L/2 has resistance "R".

Now drop in straightaway feeder = IR/2 (shown above).

Then for feeder and main system we have:—

Drop in feeder portion IR/2, i.e. drop in feeder of resistance R/2 with load I concentrated at one end.

And drop in main 1/2 × R/2 since this is distributed load of current = 1/2 I and resistance R.

Therefore Total drop $= IR/2 + IR/4 = 3IR/4$.

Thus we see that for straight-away feeder we have less drop to most distant transformer than in the feeder and main system for equal costs as to copper used. Therefore, this system should be used where constant voltage is being maintained at the station and feeder voltage regulating devices are not used.

Now let us consider the use of feeder voltage regulators. In the "Straightaway" feeder there is a total drop of IR/2 and if we regulate for the 1/3 point as discussed under secondary lines we have a variation of voltage due to line drop of IR/4 delivered to transformers at either end of the feeder.

Now in the case of feeder and main system above discussed, if we regulate for the 1/3 point between centre of distribution and the end of the mains we have a variation of only IR/8 since total drop in the main is IR/4.

Thus we have only one-half the variation between transformer although we have more total line drop.

If we assume IR/2 = 4% or 96 volts on 2400 volt line we can tabulate for easy reference the following:

Full Load Conditions.

	Single Feeder	Feeder & Mains
Total Primary line drop Station to most distant transformer.	(IR/2) 96 Volts	IR/2 + IR/4 144 Volts
Line drop to nearest transformer.	0 Volts	IR/2 96 Volts
Difference in voltage between nearest and furthest transformer.	IR/2 96 Volts	IR/4 48 Volts
If regulating equipment takes care of one-half this drop maxmuma difference of voltage applied to transformers	IR/4 48 Volts	IR/8 24 Volts

It is clear that when feeder regulators are used compensating for line drop that closer regulation can be obtained on feeder and main system.

Now take the case of a feeder which is supplied with constant voltage at the station end and no compensating apparatus for line drop is used. Suppose also that we allow 10 per cent. primary line drop it is clear that on peak the most distant transformer operates on but 90 per cent of normal voltage and neglecting transformer regulation and secondary drop, lamps on this transformer are receiving only 90 per cent, of rated voltage. If now we operate this transformer on a 5 per cent. tap in the primary winding we shall deliver 95 per cent. of rated voltage to the lamps, and deliver 105 per cent of rated voltage at no load. Thus on peak when 100 per cent. of lamp load is in service these are receiving 95 per cent. of rated voltage instead of 90 per cent and no load, when few lamps are affected, we deliver 105 per cent. volts instead of 100 per cent. Thus by the use of the tap we deliver better average service at the lamp than without.

The great problem of the electrical industry of the future is the commercial problem.—W. L. Goodwin.

Inspection Trip Over Chippawa Power Development

The convention wound up on Saturday morning with a trip over the Chippawa Power Development work of the Ontario Commission. A brief description of the work to date is given herewith, with typical illustrations to indicate the various operations and the stage of their advancement.

Thirteen-Mile Canal

The route of the big canal which will carry the water to the turbines at Queenston is shown in the map herewith. This route is about 12¾ miles long, with the intake on the Niagara River at Hog Island, Chippawa, about two miles above Niagara Falls. The tailrace is on the Niagara River about one mile above Queenston. The intake will be in what is known as the Grass Island Pool of the Niagara River. The mean monthly elevation of this pool varies about one foot.

The normal elevation of Lake Erie is 573 feet; of Grass Island Pool, 563; of the proposed power house site, 247; and of Lake Ontario, 245. Probably no river has a more uniform regimen than the Niagara. The minimum flow is about half the maximum, and over a period of fifty years the maximum difference in mean monthly levels under normal conditions, either at Queenston or Chippawa, amounts to only about six feet.

The best intake and power house locations were first determined upon, with a view to the maximum utilization of the available head, and contours and borings were then studied to decide by what route a canal could connect those two points to the best hydraulic an deconomic advantage. The intake was located at Hog Island partly on account of that point being just above the critical section at which the water begins to speed up for its passage over the Falls. Location further up the river would have meant a larger canal and further downstream would have necessitated a loss of head. Another reason equally important for locating the intake at Chippawa was the use which could be made of the natural channel of the Welland River—often called Chippawa Creek—which comprises about 4¼ miles of the route of the Canal, leaving only about 8½ miles to be excavated, although the Welland River will have to be somewhat deepened. The flow of the Welland River, which is a sluggish stream with a very flat gradient, will be reversed for this 4¼ miles.

8½ Miles Excavation

This 8½ miles of excavated section compares with 19½ miles for the old Jordan-Erie scheme, and the net head is 305 feet, compared with a possible 299 feet for the Jordan-Erie project. (See map).

The gradients adopted for the canal average about one foot per mile, or a total of about eight feet in the 8½ miles of excavated canal. The loss of head in the penstocks, due to friction, may amount to upwards of two and a half feet, and the loss in the Welland River from Hog Island to Montrose, where the excavated canal begins, will be about 6 inches, under maximum load, so that the total loss of head will be about 11 feet, making the net effective head about three hundred and five feet under normal conditions.

Thus, of the 327 feet normal difference in level between the two lakes, only 22 feet head will be lost—10 feet between Lake Erie and Hog Island, 11 feet between the intake and the tailrace, and two feet between the point of discharge of the tail water and Lake Ontario.

The power house will be located in the bottom of the gorge, about three-quarters of a mile above the Lewiston Bridge, just below where the last rough water disappears. The cliffs the nearly vertical at this point, and as the gatehouse will be on the cliff immediately above the power house, the penstocks will be nearly vertical and only about 450 feet long, thus reducing cost and head loss to a minimum.

With this scheme of deevlopment about 30 h.p. will be obtained from each second-foot of water used, compared with about 14 h.p. per second-foot obtained by the existing plants at Niagara Falls. With 36,000, the whole treaty allotment of second feet available, over 1,000,000 h.p. can be developed.

All of the excavated section of the canal will be in solid rock, with the exception of 1¼ miles of earth section running north from the Welland River and half a mile of earth section across the whirlpool ravine. These sections will be trapezoidal in shape, lined with rip-rap. The section at the whirlpool will also be faced with concrete.

Rock Section

The rock section is 48 feet wide at the bottom, with perpendicular sides, the average wetted section being 35 feet deep and lined with concrete. The velocity in the rock section will be about 6 feet per second when the plant is under maximum load. The earth overburden above the rock surface will be generally sloped 1½ to 1, but a flatter slope is provided for where local conditions require it.

The Commission has purchased a tract of land as a right-of-way which will be sufficient for all present and future needs. This right-of-way includes about 200 acres near St. David's which will be used as a dump for the disposal of excavated earth and rock.

At a point 2,400 feet distant from the gatehouse, the canal begins to widen into the forebay, the forebay gradually increasing in width to four hundred feet, which will be the approximate overall length of the gate house. The initial development provides for four steel penstocks each about 14 feet in diameter, 450 feet long; and one exciter penstock, about 5 feet diameter.

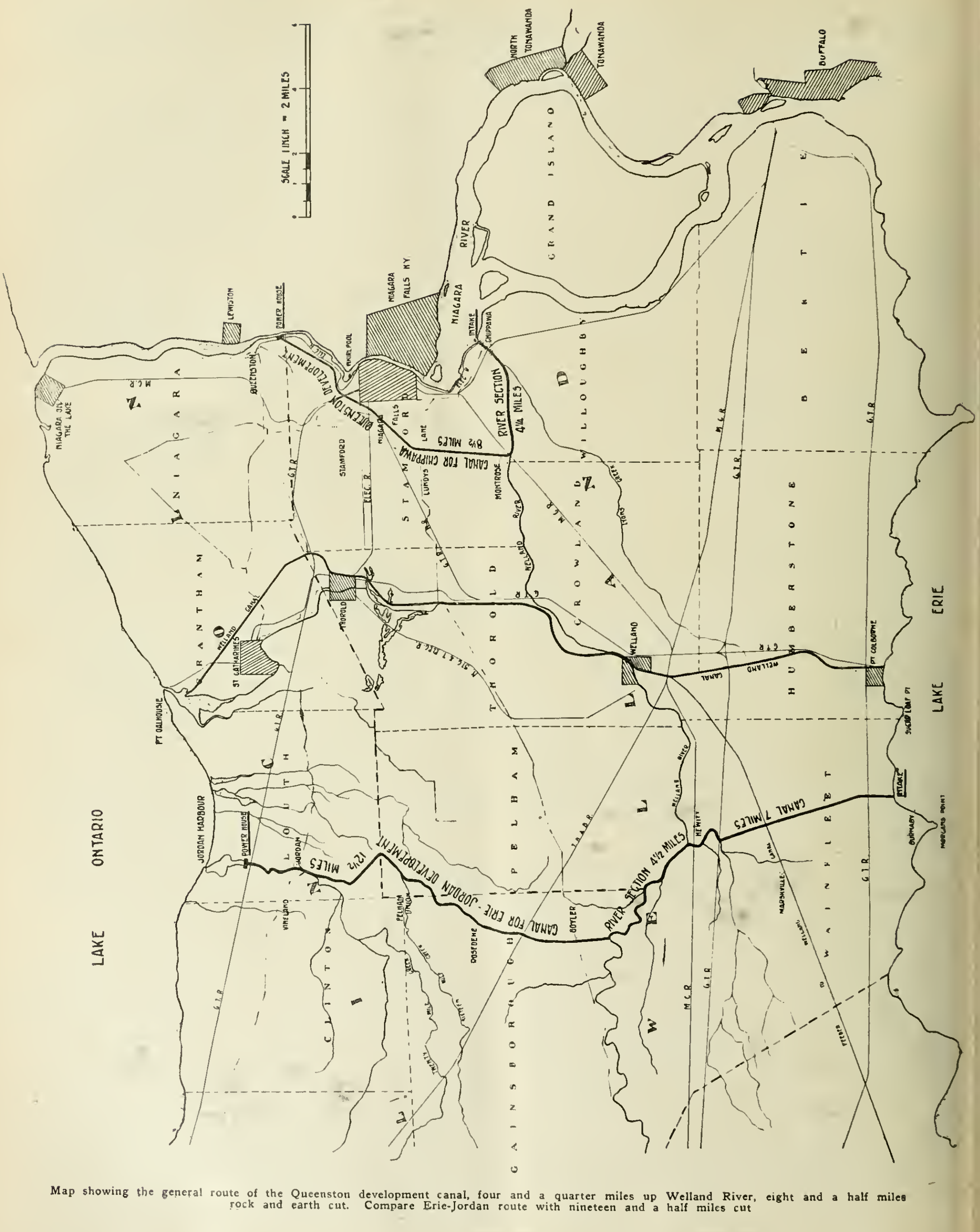
Provision is being made for the installation of four main generating units each of 50,000 h.p. capacity. Both the gate house and the power house are so designed that they may be extended whenever conditions warrant.

The surveys for the work were begun in 1914 and continued for nearly two years. uring the year 1917 the construction plant was brought onto the job and assembled, and during the first part of 1918 the camps were completed.

The Three Largest Shovels Ever Built

The main equipment for the earth and rock excavation consists of three of the largest electrically driven shovels ever built. They are of the revolving type, built by the Bucyrus Company, and are fitted with an 8-cubic-yard bucket for excavation in earth, and a 5-cubic-yard for rock work. The boom on these shovels is about 90 feet long, and the dipper stick 58 feet. Either shovel can load dump-cars which stand on a track the level of which is 62 feet above the level of the track on which the shovel stands. The shovel rests on two tracks (four rails) 30 feet centre to centre and is mounted on 16 wheels. The nominal horsepower of each of the two shovels is 715 h.p., upon a half-hour intermittent rating. Each shovel weighs over 300 tons, contains 75 tons of ballast, and has a capacity of 3,000 to 5,000 cubic yards per 10 hour day when handling earth.

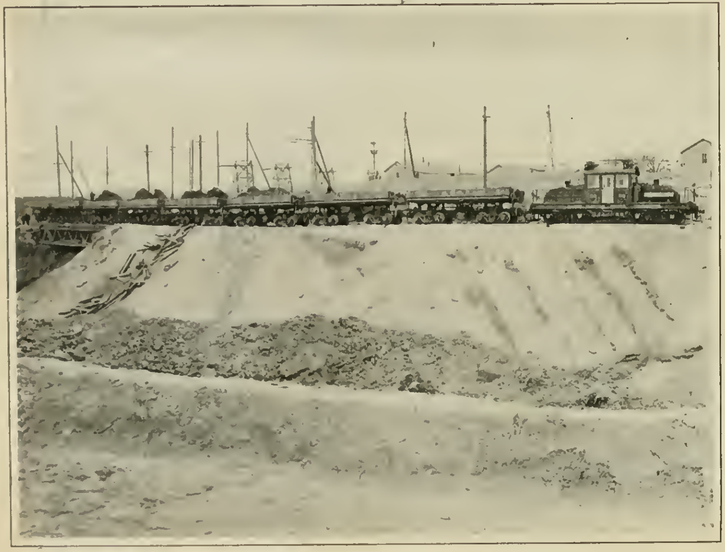
There are also five other electrically-driven shovels at



Map showing the general route of the Queenston development canal, four and a quarter miles up Welland River, eight and a half miles rock and earth cut. Compare Erie-Jordan route with nineteen and a half miles cut

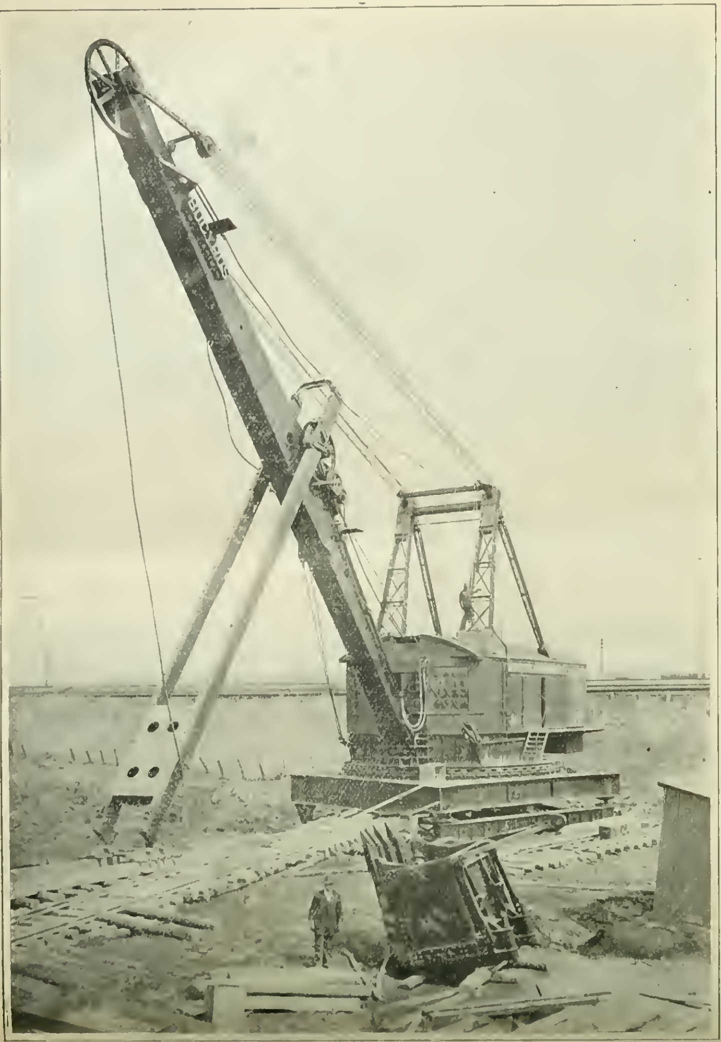
Excavation east from Bowman's Ravine late in 1918

Dredging Welland River—bucket dumping. Load about 3 yards

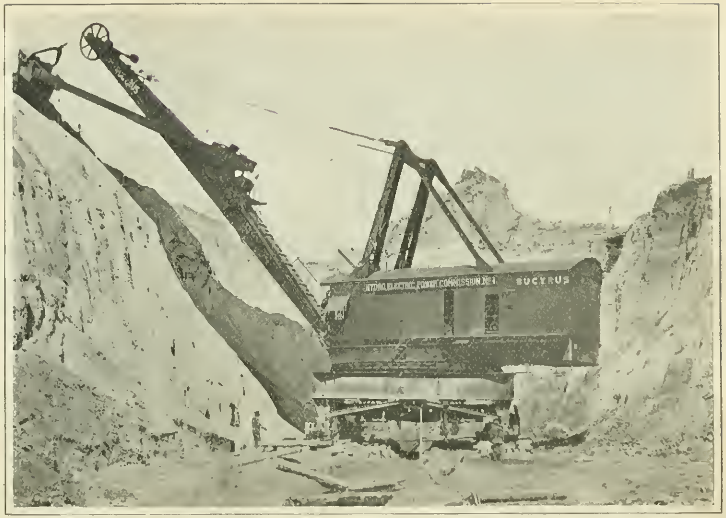


An electric locomotive and train of 20-yard dump cars. The usual train is 10 cars

Bucyrus in act of dumping 8 tons of earth



Assembling one of the big Bucyrus shovels equipped with 750 h.p. motor—Lifts 8 to 10 cubic yards each time



Bucyrus shovel lifting 8 cubic yards of earth and loading cars 70 feet above

Big Bucyrus shovel loading cars, 8 tons at a time

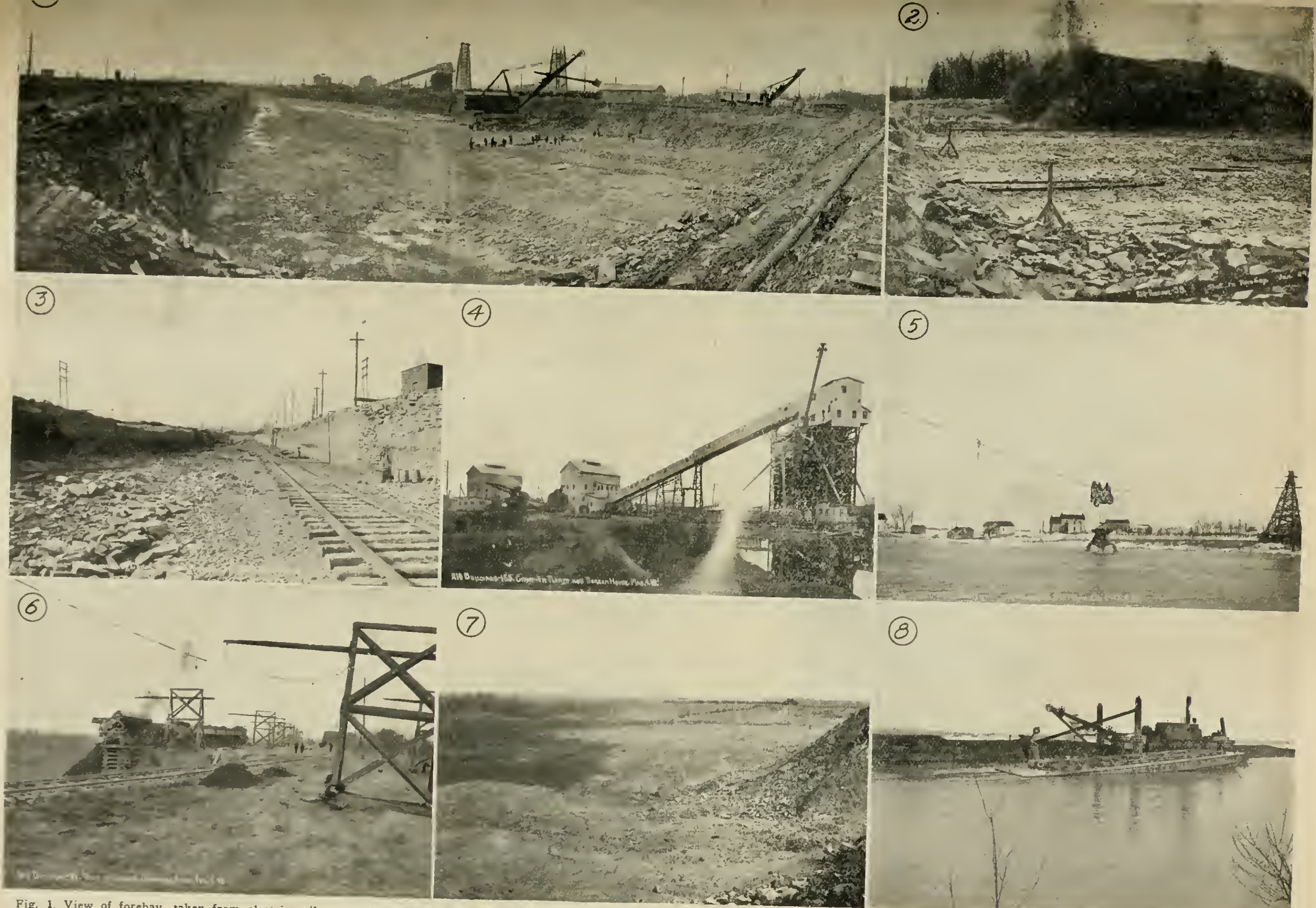
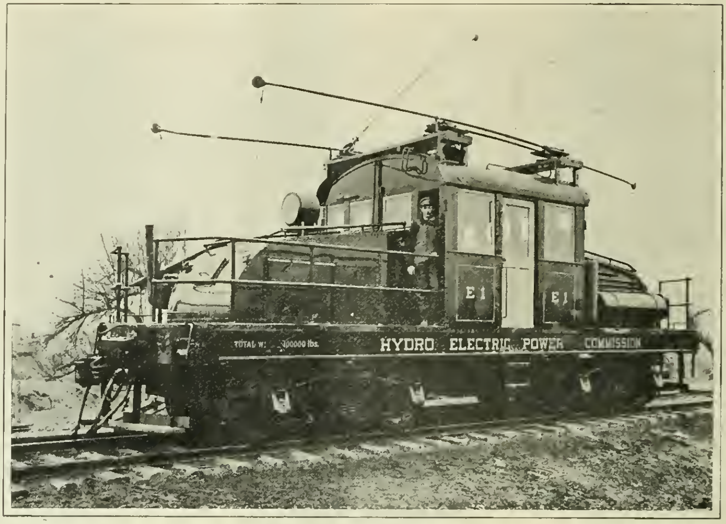


Fig. 1. View of forebay, taken from electric railway track which rests on the immediate crest of the bank above the proposed site of the power plant at Queenston—solid rock, showing about 25 foot in depth excavated. (2) View of forebay immediately following shot. (3) Looking up canal excavation from forebay. (4) Crusher plant. The rock is coarse crushed in the building at the left, transported on belt conveyor to the second building containing secondary crushers, and finally hoisted to the screen house on the extreme right of the picture. (5) Showing Lidgerwood cable bucket in operation, just rising with its 3-ton load; this bucket makes a trip every 2 minutes. (6) Large disposal area, showing load being dumped, also movable trolley-pole line. (7) Another view of disposal area; train of cars in distance being unloaded. (8) Dredging work under way at Hog Island, at entrance to Welland river; scows in distance being unloaded.



One of the electric locomotives. Note the double trolley arrangement, two poles on each side

work, having dipper capacities ranging from ⅞ cubic yards to 4½ cubic yards.

On the Welland River section of the canal, a Lidgerwood cable excavator is at work, fitted with a 3-cubic-yard Anderson-Evans clam. The cableway has an 80-foot head tower and 60-foot tail tower, and a span of 800 feet. The excavated material is being disposed of along the north bank of the river. The width of the Welland River at the water line averages about 300 feet.

The Commission has purchased one hundred and fifty 20-yard Western airdump cars, each of 80,000 pounds capacity; also seven 40-ton steam locomotives and twelve 50-ton electric locomotives. The steam locomotives are switchers purchased from the Pennsylvania Railroad. The electric locomotives were built by the National Steel Car Company, Limited, of Hamilton, Ontario, six of them being constructed with General Electric equipment and six with Westinghouse equipment. Two pile-drivers are at work on the river section. There are three 40-ton and two 15-ton Bay City locomotive cranes for general utility work.

15,000,000 Cubic Yards of Excavation

It is estimated that 9,000,000 cubic yards of earth and 4,000,000 cubic yards of rock must be removed from the excavated section; and from the river section, 2,000,000 cubic yards of material, mostly earth.

At the present time the material which is being excavated from the Whirlpool sections is being used to fill the old Whirlpool gulley, but the main dump, as already noted, will be at St. David's. A double-track railway line runs the full length of the canal from Montrose to the forebay, and a 2½ mile span connects the main line with the St. David's dump.

There will be various other branches of the railway constructed from time to time as needed. A railway will probably be built from the power house to connect with the Michigan Central at Queenston to bring in the machinery and to take out the materials excavated from the power house substructure.

The railroad lines are all electrified, the trolley wires being offset to one side of the track, and carried in clamps devised by the Commission's line construction department. These clamps and the hangers which suspend them from the poles are all made up of standard material, and are so arranged that the temporary use of the material does not injure it.

Framed timber trestles are set alongside the dump and other temporary tracks to carry the trolley wire. These trestles are mounted on wheels or skids and can be removed readily by a locomotive crane when it is necessary to shift the track.

In the Whirlpool yards is located a large repair shop containing drills, shapers, planers, lathes, forges, steam-hammers and wood-working machines. The Commission has built about eighty buildings, including bunk houses, freight houses, offices, machine shop, storehouses, substation, etc.; also a number of buildings are used which were on various parcels of purchased property.

Gunite Buildings

Most of the buildings are of frame construction, but are being "gunited" on the outside over tar paper and wire mesh, using 1 to 3 mix of cement and sand. Sharp concrete sand is being used and the "gunite" applied with cement-guns. The substation, machine shop and all of the more important buildings have already been fireproofed in this manner, and it is the intention to "gunite" most of the

The great problem of the electrical industry of the future is the commercial problem.—W. L. Goodwin.

other buildings. The bunkhouses are comfortably arranged on the cottage plan.

The crushing plant is located on the forebay. It is equipped with three secondary crushers of the gyratory type and one 4 in. x 60 in. Taylor jaw crusher which will have a minimum capacity of 2,000 cubic yards of crushed stone per day.

The rock excavation at the forebay is loaded into skips which are picked up by a locomotive crane and which dump into a bin. A belt conveyor carries the stone from the bin to the crushers and from thence by another conveyor to the cars.

Centering for one of the concrete bridges over the Chippawa power canal

There are four railway bridges to be constructed over the canal, one for the Niagara, St. Catharines and Toronto Railway (electric), one for the Wabash Railroad, one for the Grand Trunk and Michigan Central Railroads. These will be reinforced concrete arch bridges. There will also have to be constructed a number of highways and foot bridges to carry the various roads across the canal.

Several hydraulic models are being prepared at Dufferin Islands, near the Ontario Power Company's intake in the Niagara River. These models are based on designs prepared by the Commission and are for the purpose of studying the design of the intake at Hog Island. The design of the intake works will be based upon the results of these studies.

Trade Publication

Metal Molding—The National Metal Molding Company, Pittsburgh, Pa., have distributed a reference chart for wiremen showing the various fittings and devices used in connection with No. 222 two-wire and No. 333 three and four-wire "National" metal molding which, it is pointed out, are inter-connecting. This chart is suitable for hanging up in the shop and a complete pocket-size descriptive bulletin will be sent by the company on request.

The shareholders of the North American Pulp & Paper Companies have approved of the organization of a company—the Saguenay Pulp & Power Co.—to take over the Saguenay Power & Light Co. and the power plants and other properties of pulp and paper companies. The new company will obtain possession of water powers capable of producing 200,000 h.p., of which its subsidiaries are now using 30,000 h.p., this including current for light and power for several villages.

Schedule of Motor Sizes for Farms

The Westinghouse Electric and Manufacturing Company have prepared the following list of motors as suitable for the various appliances now rapidly becoming standard for farm workers. Conditions will vary, of course, but the list will at least provide a basis from which to make an intelligent estimate.

Machine	Motor Horsepower Minimum	Maximum	Size Most Used
Feed grinders (small)	3	10	3
Feed grinders (large)	10	30	15
Ensilage cutters	10	25	15 to 20
Shredders and huskers	10	20	15
Threshers, 19-in. cylinder	12	18	15
Threshers, 32-in. cylinder	30	50	40
Corn shellers, single hole	¾	1½	1
Power shellers	10	15	15
Fanning mills	..	..	¼
Grain grinders	..	..	¼
Grain elevators	½	5	3
Concrete mixers	2	10	5
Groomers (vacuum system)	1	3	2
Groomers (revolving)	1	2	1
Hay hoists	3	15	5
Root cutters	1	5	2
Cord wood saws	3	10	5
Wood splitters	1	4	2
Hay balers	3	25	7½
Oat crushers	2	10	5
Cidermills	2	5	2½
Clover cutters	¼	½	½
Water pumps	½	5	3
Cream separators	1/10	¼	⅛
Butter churns	⅛	3	¼
Milking machines	3	5	5
Bottle washers	⅛	¾	½
Vacuum system	2	3	3
Refrigeration	½	25	3 to 5
Grindstones	⅛	¼	¼
Emery wheels	¼	1	¼
Lathes	¼	½	½
Forge blowers	1/15	⅛	1/10
Sewing machines	1/40	1/30	1/30
Buffers and grinders	1/40	1/30	1/30
Portable vacuum cleaners	1/83	1/45	1/83
Large ice cream freezers	⅛	¼	⅛
Washing machines	⅛	2	to ¼
Centrifugal dryers	1	2	1
Mangles	¼	1	½
Meat grinders	¼	¾	¼
Sausage stuffers	½	1	½
Water pumps	¼	1	½

Real Service

A citizen went into an electric shop in Toronto, recently, to purchase some base plugs. He was told they were an old style; the store didn't stock them. Did he know where they could be got? No, the only thing for the customer to do was try some of the other electric stores. One of the "other stores," fortunately, had a different way of handling these matters. The customer was told: "No, we don't stock them as they are rather out of date, but just leave your order and we'll have them for you inside of a day."

That's a considerable difference in store service. Is there any doubt about which store the customer will go to for future purchases?

The annual convention of the Illuminating Engineering Society will be held in the Hotel Sherman, Chicago, October 20-23. At the annual election of officers of the society, held on June 12, Mr. S. E. Doane was elected president.

The Contractor-Dealer

The Contractor-Dealer of Tomorrow—Some Suggestions as to the Immediate Fields to be Covered are Offered for Practical Consideration by Mr. John C. Rendler, President Southern California Electric Company*

> "There is a tide in the affairs of men, which taken at the flood, leads on to fortune;
> Omitted, all the voyage of their life is bound in shallows and in miseries."
> On such a full sea are we now afloat, and we must take the current when it serves, or lose our ventures."

How well the words of Shakespeare will apply to the Electrical Contractor-Dealer of Tomorrow, time alone can tell. Are we ready to take the current when it serves? I say we are. In order to more clearly define the scope of the "contractor" from that of the "dealer" and because there is a distinction between the two, I am going to deal with them separately.

The Future Contractor

The Contractor of Tomorrow is a man neat and clean in his personal appearance, his associates are architects, building contractors, and proprietors of commercial and industrial businesses. He will have a thorough knowledge of his business, its possibilities for development, expansion and opportunities. He will use only highgrade materials and employ good machines, because no business can progress on any other principle.

The contractor will consider his vocation worthy and as affording him an opportunity to serve society. Society demands honorable business methods and unless a business is constructed on such a foundation, all of our ventures will be lost. We will associate with men who compose the other branches of the industry, make our dealings with them, as also our competitors, on an ethical basis, thereby retaining their friendship, have access to their council and advice, keep abreast with the times, particularly in our own industry, then, and not until then, take the current when it serves.

Residential Work

In residences and apartment houses, too little attention has been paid to correct illumination, wiring for lamp socket and heavy wattage appliances. We so often find a residence in which the wiring has been poorly laid out. The general illumination is not sufficient for the room, the color of the walls and ceiling have received no consideration, the fixtures are selected from the standpoint of beauty and price rather than efficiency, and a harmonizing effect. The switch locations are placed at the most convenient place for the contractor, rather, than for the consumer. I have seen some very nice residences and apartments, recently constructed, with no provision for the many labor-saving, lamp socket devices. Here the Contractor of Tomorrow will demonstrate his knowledge. No residence or apartment house will be wired by him, or under his supervision, that does not have provision in every room for a plug, of sufficient capacity for 660 watts. In addition to these, provision will be made for the special plugs to care for the washer, cleaner, iron, toaster, percolator, and the curling iron in Madame's boudoir. A few other important provisions should be made. No modern residence or apartment owner, will be permitted to overlook the necessity of providing for the electric range, water heater, or large air heated. While these electric devices are prohibitive in some localities at the present time, there is no doubt in my mind that they will be as universally used as the electric iron, and in a very short time. Special care will be given to the wiring of all lamp sockets and heavy wattage appliances, to see that the circuits are wired heavy enough to carry the full load, proper fusing facilities, and entirely separate from lighting system. The time to have these provisions made in the wiring is, before the plans leave the architect's office, therefore the contractor will lend every effort to see that the architect is fully conversant with the advisability, and necessity, of providing base plugs and special outlets. While I have used the residence and apartment house in my discussion, the same condition holds true to quite an extent in office buildings and to have even greater extent in some.

The Industrial Field

Here the contractor will grasp the opportunity, which for numerous reasons in the past, he neglected to take. By hard and consistent effort, both as to salesmanship and, a better understanding of their requirements, he will win back the thousands of dollars in business that he has lost, on account of the industrials doing their own work.

Make a study of power and the relative values of it, so you can show the economy of individual drive on machinery over the long line shaft and belts that are largely in use today. Show the many advantages of electric drive over gasoline, or steam, to those who are still inclined to believe they have the best system of power. Show the manufacturer how he can increase his production, by better lighting in the factory general, and by properly lighting the individual machine. The safety of employees in the factory is very essential, therefore recommend and use necessary safety devices that will add to the protection of life and property. All motor maintenance will be done by the contractor, when he puts himself in a position to render service. A motor stopped in a manufacturing plant means the loss of time of one or more men, but this is small compared to loss entailed by the cutting off of the output of that machine. We must be ready to give instant service, make the repairs as quickly as possible, comensurate with good workmanship, charge a fair price for the labor performed and the material furnished, thus giving such efficient service that the ordinary industrial

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*Before the N.E.L.A.

plant cannot afford to maintain its own electrical department.

Again, we have an opportunity to demonstrate the many advantages of heavy wattage appliances, this time in the factory. Electric furnaces, ovens, spot welders, glue pots and hot plates are all tried and proven devices, and an opportunity should never be overlooked to recommend their use.

There are one or two obstacles which stand between the contractor and the industrial business, which I firmly believe when the contractor shows he is making every effort to secure this business, that he is deserving of it, that the jobber will see the fallacy of recognizing every industrial as a trade buyer. The manufacturer of motors will discontinue selling their product direct to the consumer, and will revise their policy, allowing the contractor a sufficient margin of profit to warrant his doing the sales and engineering work. The contractor, who is not an electrical engineer, may not be aware of the fact that most power companies maintain a corps of engineers who will lend him, without charge, any assistance desired, in laying out new plants or remodelling old ones. The offer of this service should be appreciated and used advisedly.

Electricity on the Farm

A large, new and undeveloped field is open to the electrical contractor in the use of electricity on the farm. I have a vision of driving out the country boulevard and stopping at the modern farm. The first thing we notice is the light at the entrance gate; as we drive in we find the yard and all the buildings are lighted on the outside. On entering the milking room we find that electric milkers are used exclusively, the building is well lighted, and motor driven conveyors are used for handling the milk and feed. In another small building we find the food chopper electrically driven. The separator, the churn and ice-cream freezer are driven by motor, and in the laundry the washing machine and iron hold forth ready to perform their service at the touch of the button. In the barn, we find a motor connected to a hoist, for the purpose of raising the feed to the loft, or loading the

Officers of the newly formed Montreal Electrical Contractors' Association

Mr. R. Moncel, President

Mr. F. J. Parsons, Vice-President

Mr. H. Vincent, Executive Committee

Mr. J. A. St. Amour, Executive Committee

Members of the Montreal Electrical Contractors' Association decided, at a recent meeting, not to recognize the union; the demands of the union being regarded as preposterous. The wiremen have gone on strike, but, at a further meeting on June 24, it was decided by association members to sit tight and await developments. Some of the contractors state they are not affected—most of the men being at work.

wagon. All the wood is sawed by an electrically driven saw. The water the farmer drinks and that with which he irrigates his land, are pumped by an electrically driven motor. In fact, I believe the modern farmer has become so energized with the electrical idea that he is largely propelled by the thought of it.

What has been said about wiring, switches, base plugs and heavy wattage appliances for the residence and apartment house, apply equally as well in the modern farm house. In fact, the heavy wattage appliances are more essential on the farm, because in most cases gas is not available for heat or cooking.

In localities where there is no power available, another field opens to the contractor—that of furnishing farm lighting plants complete. I would not recommend one in a place where a public service corporation could serve, because the private plant is limited in its capacity, requires more care, and the first cost is quite a factor. Also, the private plant cannot be operated as economically as the power company's service can be purchased. The possibilities, however, for wiring and motors in the private plant are similar, with the exception of their limited capacity. With the modern farm, having from one to ten motors a good business in maintenance may be worked up by the contractor, and what has already been said about service, in industrials, applies equally well here. By all means make the farm wiring and installation comply with all state safety rules, even though it may not be inspected. With this tremendous field open to the contractor now, almost at its birth, he will do well to fit himself for immediate action, grasp this opportunity, for some one surely will, and let it not be a plumber or a blacksmith.

I have endeavored to cover some of the problems of the Electrical Contractor of Tomorrow, and to suggest solutions of these problems; it is now my purpose to enumerate some of the opportunities of which the Electrical Dealer of Tomorrow will take advantage.

The Dealer

Considerable has been said about the electrical dealer as a merchant, all of which has been very instructive to him. I believe, however, that as he is young in a business way, he must, as a child, learn to crawl before he can walk. In establishing a location, two things must be borne in mind: First, the traffic or shopping procession; second, the possibilities of the city's future development. These two things for permanency, as establishment in a particular location is a valuable asset to a merchant. A move is very expensive. The selection of a store, whether it be on a corner, or in the middle of the block, depends upon the rent, and more particularly upon the gross profit upon which you work in the sale of your merchandise. The gross profit allowed the electrical merchant today does not permit of him opening a store in the heart of a shopping district.

A location being selected, "regardless of the district," too much consideration cannot be given to the furnishings. A carpeted floor, if possible, enclosed glass wall cases and show cases, to properly display merchandise and to keep it clean. The shelves where the small devices are kept, should receive especial attention, for there are a number of stores whose general good furnishings are marred by the appearance of their shelves. The store, wall and show cases should be well lighted, thereby offering the suggestion to your customers of better light. If the store arrangement will permit of it, I would have two windows, so that one would always be on display, while the other was being trimmed. To obtain the best results, a window should be trimmed once every week, concentrating your display on one thing, rather than trying to show everything you have in your establishment. A valuable lesson has been taught to the dealer, which the Dealer of Tomorrow will take advantage of—that of stocking inferior merchandise and appliances. No appliance, device or merchandise will be put on the shelves for sale, that does not carry the personal guarantee of the dealer. The time has passed when a customer, bringing in a defective article, will be told that it will have to be sent to the manufacturer for replacement. I firmly believe that had this policy been in effect for the past five years, the electrical dealer would today be doing 50 per cent. more business. The consumers finding that the electrical merchant's wares were no better, and his service poorer, they made their purchases at the hardware, department, and grocery stores on account of their convenience.

Next to highclass merchandise for sale, comes the necessity of highclass salesmen to sell it. A salesman will either bring repeat customers or drive them away. See that your salesmen are possessed of good personality, understand your merchandise thoroughly, are well dressed and neat in appearance, though not expensively; are kind and courteous, and your business will grow by leaps and bounds. Install a good delivery and repair service; it is necessary, as the customer has been educated to expect and demand these things. Join your Association, your Chamber of Commerce, your Rotary Club, or any other business organization that is interested in building up your city, and thereby take your place in the front ranks of your city's business activities.

Business Building

A short time ago this part of the dealer's business was a puzzle of considerable moment to him. At each thought of some plan to build new business, he was confronted with the plan then in effect by the power company. He could not sell at their prices, meet term payment plans, or make repairs free of charge. Happily, this is a thing of the past. Again I ask, "Will the electric dealer take the current when it serves?" I answer, "He will." How is he to go about it?

He will advertise to the limit of his financial possibility, his name, his business and his location. Let me say here, that I do not believe it would be amiss if the manufacturer apportioned some of his national advertising fund for use in fertile local fields. Since practically all agencies for specialties and appliances are exclusive, and are distributed through an electrical jobber, he also should do local advertising in some form, either through the newspapers or by campaign, always referring to the dealer as his sales agent. The dealer will do seasonable campaigning, employing highclass salesmen to canvass the city, in the same manner as formerly employed by the power companies. The adoption of the term payment plan on the larger devices, is absolute necessary, and properly handled will be the best business builder the dealer has. Advertise this feature of your business at all times. Select a good standard line that is well advertised nationally, and then show in your advertising why this commodity should be purchased from you, rather than elsewhere. Tell the public about your service department, your personal guarantee, your knowledge of things electrical, all of which will enable you to serve them better. Your window is your best salesman. Make use of it. Tell your story to the passerby so that he gets it at a glance, and once you get him in your store, good salesmanship will do the rest. We must get our name and business before the public, and in much larger type than we have been able to do in the past. The down-to-the-minute dealer is soliciting consumer lamp contracts. The lamp business is not only profitable in itself, but serves as bringing additional business from the consumer. The dealer's progressiveness will lead him into many fields in which the harvest is very poor now, among them the office building and some industrials. By his consistent effort and progression, the jobbers and manufacturers who are now serving this class of trade, will see the advisability of discontinuing their

Goodwin says the "best" form of advertising is the well dressed window. Cowan's, of Brantford (T. A. Cowan and C. D. Henderson), used this fine June bride display. Mr. W. B. Hutton is manager of the electrical department.

efforts, and leave the work and the business to the dealer. No jobber or manufacturer should solicit or accept a consumer lamp contract, when there are progressive dealers in the vicinity.

A manufacturer should not sell motors direct to the consumer, when he finds the dealer ready to perform the service that is necessary. In other words, when the dealer perfects his selling force to its highest efficiency, his only competition will be from his competitor dealer, and then on an ethical basis.

Accounting and Collections

As we develop our business, its growth demands of us a better accounting and collection system. Adopting the term payment plan for selling merchandise, without developing an accounting and collection system to handle it, would recommend a separate ledger for all term accounts, using a card follow-up system. Adopt a policy at once, allowing not more than two payments to lapse without taking back the merchandise. Notify your customer about five days in advance of date payment will be due. Try to get them to come to your store to make their payments—it means additional business to you. Use good judgment when sickness or accident prevent a customer from paying, but accept no fake story. If you have sold good merchandise at an honest price, you are entitled to be paid for it. Numerous failures are recorded on account of poor collecting methods, and the fear of hurting your customer's feelings, by asking them for what is justly due you. The accounting department should be so kept that you can get complete information regarding any part of your business. Your monthly report should be as complete as your annual report, with the exception of a physical inventory. The merchandise account should show you the number of times per year you turn your stock. Your sales account is your stimulator, and you are the stimulator for your organization. It also gives you the figure from which to make your advertising appropriations. It shows you the advantage of discounting your bills. You get a monthly comparison of one month with the next. Also, comparing a month with same month of the year past, you can ascertain if you are maintaining a steady growth. Each department should be kept separately, and bear its ratio of the general expense; in this way you know from where your profits are derived, as well as the source of losses. I know of a case where a department had been losing approximately $350 per month for two years, and it was never found out until a good accounting system had been put in. I believe it is the best money a dealer can spend.

Another vital point of your business that is brought to your attention by a good accounting system, is your cost of doing business. You must constantly watch this important item, or your expense will grow without your noticing it. A good form for this is to have your bookkeeper list your overhead on a separate sheet in monthly order, so that at a glance you can see the comparisons.

The Consumer's Good Will

There is nothing so essential to the success of our business as the good will of the consumer. It is easy to discuss the progress of the contractor-dealer, the many new fields in which he has to work, and the planning of this work, but the success of it all is in the hands of the consumer. We can obtain this good will only by preparing ourselves to be generous in the extension of good will to others. Make as the main policy of our business. Honesty and Fair Dealing; inculcate this idea in the minds of our organization, advertise it, then by all means, practice it, and we will be doing justice to the consumer, to ourselves, and to our profession

In summing up the possibilities of the Contractor-Dealer of Tomorrow, it seems to me, there never was a time in the history of the electrical business when opportunities such as we now enjoy were within our grasp. I should say it is now up to us to show that we are capable of handling the situation, of putting forth renewed effort, or re-energizing our selling forces, of establishing new forces to care for new fields, of living up to the claims we have made in our own behalf, and show in the words of Shakespeare, that, "On such a full sea are we now afloat" we will "Take the current when it serves" and so "Lead on to fortune."

New Book

Induction Coils—By Professor F. E. Austin, E.E., Hanover, N.H.; published by the author; price $1.00. It is the aim of this book to so present an explanation of the fundamental principles as to enable anyone to construct induction coils to fulfill specific requirements. The author points out the importance of the induction coil without which the gasoline-driven automobile would be impossible; nor could there be telephony over any but short distances. The induction coil has also made wireless telegraphy possible and also the application of "X" rays in both diagnosis and therapeutics. Those who desire to construct coils to operate wireless outfits will find specific instructions in this book for building coils for large and small ranges. Much of the material presented is the result of the author's experience in directing the courses in Radio and Buzzer Training, Dartmouth Training Detachment of the U. S. National Army.

New Power Plant for Dominion Steel Co.

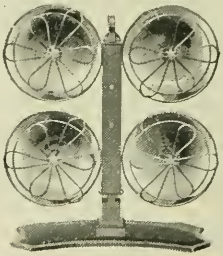
The Dominion Steel Corporation, it is announced by Mr. Mark Workman, the president, have decided to install a new electrical power plant, to supplement the present equipment. The plant will be operated by waste gases from the blast furnaces, and will not only provide a safe margin over existing requirements, but will furnish sufficient additional power to take care of the needs of mills and other plants now operated by steam. The plans include the eventual electrification of practically all the apparatus now operated by steam power, such as the blooming mill, rail mill, loading and discharging apparatus at the piers, etc., and will promote large economies.

C-H Seventy-Fifty Switches

The Benjamin Electric Manufacturing Company of Canada, point out to dealers the dissatisfaction that often results to users of electric appliances by habitual pulling out of the terminal connectors of electric irons, toasters, and so on. The flashing at the terminal that inevitably results with a worn cord has doubtless been the cause of frightening many women from the further use of their appliances. The C-H Seventy Fifty switch has been designed to remedy this difficulty. Dealers not only find them ready and profitable sellers, but also that they increase the comfort and convenience customers derive from their appliances and, consequently, leave them in a favorable frame of mind for further sales.

American Beauty "Quad" Heater

The illustration herewith shows a new quadruple radiant heater, called the "American Beauty Quad," manufactured by the American Electrical Heater Company, Detroit, Mich. This is similar in design to the twin radiant heater; it has removable heating elements and guards and movable reflectors. Each element is rated at 330 watts, making the combined demand 1320 watts. However, all four units need not be used at once as there is a push switch provided for the upper pair, and another for the lower pair. The unit may be used as a portable or may be permanently mounted on a wall. Attention is called to the fact that heat may be sent in one or several directions at the same time, because of the movable reflectors.

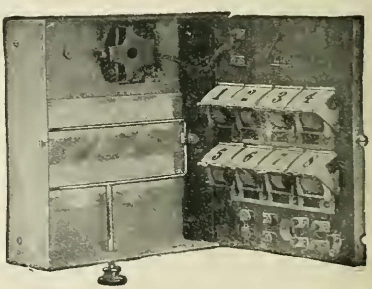


National Tube Co. Distributors

The National Tube Company, Pittsburgh, Pa., announce that they have made arrangements with the National Metal Molding Company, of Pittsburgh, and the American Circular Loom Company, of New York, to act as their distributors of Spellerized Mild Steel Tubing, made especially for the manufacture of rigid steel conduits. These two companies will, as heretofore, finish and market this tubing under the following trade names: the National Metal Molding Company—"Sherarduct," a sherardized rigid steel conduit, and "Economy," a black enameled rigid steel conduit; the American Circular Loom Company— "Xduct," a galvanized rigid steel conduit, and "Electroduct," a black enameled rigid steel conduit.

San-Fer-Ann Annunciator

Edwards and Company, of New York City, are putting on the market their San-Fer-Ann annunciator, illustrated herewith. The San-Fer-Ann is a high grade instrument, the case being made of steel, white enamelled finish, with nickel plated ball and trimmings. The drop openings are fitted with glass, and the case is securely fastened to the back board with hinges on one side, and a screw lock on the other. This makes a very secure form of fastening. At the same time the mechanism of the annunciator is very accessible, and in case it is desired to change the lettering



on the drops this can be done with a minimum amount of trouble. This annunciator has gravity drops which are locked in position so that it is impossible for them to shake down by vibration; however, as soon as the circuit is closed the drop falls by gravity. It is particularly suited for houses, apartments, hospitals, etc., and can always be kept clean, as any dust or discoloration can be removed with a damp cloth. The case being made of steel prevents warping, splitting or twisting. The Northern Electric Company are Canadian distributors.

A Good Testimonial

We don't take in washing, but here's story on the sales department. The other week a lady called up and asked to have an electric washing machine sent up on free trial, as we were offering at that time.

An attendant went along with it, and he doffed his coat and got to work on the wash. In no time the work was done, and then milady called us up and said.

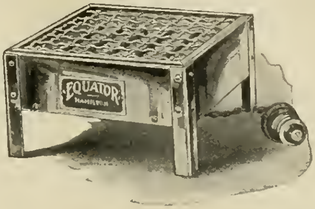
"Thank you so much for the washing machine. I was leaving to-night for Calgary and I could never have got my washing done. Will you please send up for it before 5 o'clock?"—B. C. Buzzer.

Denzar Lighting Units

A highly efficient lighting unit for offices, stores, factories, schools and public buildings—the Denzar—is manufactured by the Beardslee Chandelier Manufacturing Company, Chicago, and is shown in the accompanying illustration. The company call particular attention to the following features: (1) Housing of steel, white porcelain enameled; (2) Yoke of spring steel supporting metal holder; (3) Metal holder supporting reflecting dome and lower bowl; (4) Reflecting dome of opal glass, softens and distributes light; (5) Adjustable hanger for adjusting lamp without removing glassware; (6) Deflector diverts upward rays downward to working plane; (7) Upper part of bowl clear glass, protects lamp from dust and dirt; (8) Lower part of bowl white enameled glass, softens and diffuses light; (9) Air intake allows cool air to pass upward continually around lamp. The Denzar unit is distributed in Canada by the Perkins Electric Company.

Equator Toaster Stove

The illustration herewith shows the "Equator" toaster stove, manufactured by the Equator Manufacturing Company, Hamilton, Ont. It is a very ruggedly constructed appliance, built of nickel plated, cold rolled steel and rated at 550 watts. It is approved by the Hydro-Electric Power Commission.



Personals

Mr. Wills Maclachlan was elected one of the vice-presidents of the American Institute of Electrical Engineers at the annual meeting of the Institute held in New York, May 16.

Mr. F. I. Spielman, of Spielman Agencies, Regd., Montreal, agents for Griffiths Bros. & Co., London, British Aluminium Co., British Ever Ready Co., etc., is on a business trip to England.

Mr. F. T. Kaelin has been appointed chief engineer of the Shawinigan Water & Power Co. He was formerly assistant chief engineer, and joined the staff in 1902, coming to Canada from Switzerland.

Mr. H. Hulatt, manager of telegraphs, Grand Trunk and Grand Trunk Pacific Railways, Montreal, has been elected second vice-chairman of the Telegraph and Telephonic Division of the American Railroad Association.

Mr. Geo. D. Perry, general manager of the G. N. W. Telegraph Company, was presented with a cabinet of silver at the recent conference of managers and superintendents held in the Carls Rite Hotel, Toronto.

Mr. J. N. Lanphier has been appointed electrical inspector of the Collingwood district, succeeding Mr. R. R. Matson, resigned. Mr. Lanphier is a returned soldier and has been for some time assistant inspector in the Hamilton district.

Mr. F. W. Teele, vice-president and chief engineer of the Southern Canada Power Co., Montreal, has been appointed general manager of the Mexican Light & Power Co. and the Mexican Tramways Co. Mr. Teele will take up his residence in Mexico City.

Sir Oliver Lodge has been awarded the Royal Society of Arts Albert Medal in recognition of his work as the pioneer of wireless telegraphy. The medal was instituted in 1864 to reward "distinguished service in promoting arts, manufactures, and commerce." The presentation has been made by the Duke of Connaught.

The Electric Reduction Co., Buckingham, P.Q., are about to extend their dam, with a view of increasing the water power, in connection with their plant. Mr. J. B. McRae, of Ottawa, is the engineer. The contract has been awarded to the Foundation Co., Montreal.

A new sub-station is to be erected in the north part of the city of London for the supply of current to factories in that section.

Twin City Electric Club Meeting

A very enthusiastic and successful meeting was held in Kitchener at the Twin City Electric Club quarters on Tuesday, June 10. Mr. K. A. McIntyre was the guest of the Club and gave detailed information in regard to the affiliation of the local electrical contractors club with the National Association of Contractor-Dealers. Mr. McIntyre showed himself to be entirely familiar with the great benefits to be derived along this line and the prospects are very bright for such an affiliation, the members being quite enthused over the benefits to be derived, which they believe will well repay them for their association membership. The Kitchener contractors and dealers attended the regular meeting of the contractors' and dealers' Club in Brantford on June the 17th inst., where the prospective affiliation was further discussed.

The Twin City Electric Club has been in formation for practically three years, and during that time complete co-operation has resulted, to the great benefit of consumers, central stations and contractors, all differences, etc., being amicably and fairly adjusted, and the members feel that the time has been well spent and results obtained have more than justified the time and expense.

The President of the Twin City Electric Club, Mr. F. O. Ellis, expressed himself thoroughly interested in the promotion of like electrical clubs throughout the country and of clubs being associated under one head in a district which would comprise central Ontario. He feels that such an association could benefit the interested parties generally to such an extent that they would likewise become very enthusiastic over the results that would be obtained from such an organization.

It is the intention of the Kitchener Club to have a representative at the Milwaukee National Convention.

New Montreal Engineering Company

Monks, Manhard & Dawson, consulting engineers, agents and contractors, have opened an office at 813 New Birks Building, Montreal. All three members of the firm—Lt.-Col. K. C. H. Monks, C.E., Lt.-Col. W. E. Manhard, D.S.O., B.Sc., and Capt. F. M. Dawson, M.C., B.Sc., M.C.E.,—have served with the Canadian Engineer Corps overseas. Lt.-Col. Monks—who is now in England on business—was on the headquarters staff O.M.F.C., London, as director of Engineer Services and Quartering, and responsible for all technical details relating to leasing, contracts, building construction, and maintenance of heating, lighting and power plants in use by Canadian troops in England.

Statistics show that 25 per cent. of factory accidents are due directly or indirectly to poor lighting.

Messrs. Meldrum & Sterne have left for England, to open an office for the Shawinigan Water & Power Company in London.

Baetz Brothers Specialty Company, Limited, has been incorporated, with head office at Kitchener, Ont., and capital stock $40,000, to manufacture and deal in electric fixtures and supplies. The principals of the company are Messrs. J. H. Baetz, C. J. Baetz, W. J. Flieschauer, of Kitchener; F. Anthes, of Montreal, and W. H. Beney, of Toronto.

The manufacture of glass pencil prisms is another German and Austrian industry which has been established on the North American Continent. Formerly we were entirely dependent on these European countries for the prisms, but now they are being manufactured in large quantities on this side, and can be obtained in Canada from Armour Bros. of Montreal.

Current News and Notes

Bridgeburg, Ont.

The Welland County Telephone Company, Bridgeburg, Ont., have taken over the stations of the Bell Telephone Company at Bridgeburg, Fort Erie, Ridgeway, Chippawa and the lines in the townships of Bertie and Willoughby. The Bell company will take over a small portion of the Welland Company's lines in Port Colborne and Humberstone. This action will render unnecessary considerable duplication of telephones in business houses.

Montreal, Que.

The International Electric Company, Limited, have been granted letters patent under the Quebec Companies Act. The capital stock is $75,000, and head office, Montreal.

J. Oritz & Company, electrical contractors, Montreal, Que., have registered.

The Victoria Electric Supply Company, Montreal, is among recent registrations.

New Westminster, B.C.

A new factory is planned for the manufacture of electrical equipment on Industrial Island, of New Westminster, B.C. The factory will be built by the Electrical Mfg. Co.

Niagara Falls, Ont.

W. P. Dixon, electric supplies, Niagara Falls, Ont., suffered loss by fire recently.

Peterboro, Ont.

The Hydro-electric Power Commission have been negotiating to purchase the dam at Lakefield owned by the Dickson estate. The estate has placed a price of $200,000 on the dam. A more favorable price may be arranged by arbitration.

Portage la Prairie, Man.

A by-law authorizing an expenditure of approximately $350,000 for the construction of a transmission line from Winnipeg to Portage la Prairie, Man., was carried by a large majority. The work will be supervised by the electric departments of both cities.

Toronto, Ont.

The Pierson-Wilcox Electric Company, a company incorporated in the State of Minnesota, has been granted a license to transact business in Ontario.

Windsor, Ont.

It is stated that the Hydro-electric Power Commission of Ontario have abandoned their announced intention of purchasing the lines of the Sandwich, Windsor & Amherstburg Railway. An increase in fares is considered very probable and this, it is thought, will so increase the value of the company's franchise that the Hydro-electric Commission could not purchase advantageously.

The Hon. Jules Allard, Minister of Lands and Forests for the Province of Quebec, in reviewing the policy of the Government in developing the water powers, stated that the construction of the St. Maurice dam had resulted in an annual profit, after providing for interest, redemption, and sinking fund. Mr. Allard said that it had been claimed that in Ontario power could be developed cheaper than in Quebec. The Government was open to conviction, and would change the system now in force if matters could be bettered, but he had gone into all claims, with engineers and accountants, and still believed that the system in Quebec was the best.

The entire holdings of the Renfrew Electric Manufacturing Company, Limited, have been purchased by the Renfrew Electric Products, Limited.

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Generation, Transmission and Application of Electricity

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ADVERTISEMENTS

Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

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Labor Unrest Not Primarily Due to Need for More Money

During the month of May last the savings deposits in Canadian banks increased by $37,000,000, or at the daily rate of $1,200,000. During the year ended June 1st, 1919, savings deposits increased $160,000,000; this in the face of Victory Loan subscriptions of nearly $700,000,000 during this period, as well as other provincial and municipal issues.

The savings bank is looked upon, in large measure, as a barometer of the working man's economy. The present increase in savings would indicate, therefore, that the working classes, in general, are prosperous and also that they are profiting by our various campaigns on thrift. Coupled with the present labor unrest these larger bank accounts seem to show that it is not the actual need of more money that leads the workman to demand higher wages but rather the fact that he has had a little taste of saving, of getting a little bit ahead of the game and he wants more.

This feeling of independence that a savings account engenders is a fine thing for the individual but there is evidence that it has developed into a sort of intoxication in many of the trades which will eventually get them, and all of us, into trouble. The ideal of a capitalistic working class can never be entertained. The main reason is that they don't need capital. What the working man needs is such a fair payment for his labor that he can live in comfort and lay a little aside for the rainy day. If he spends money extravagantly or foolishly he is being paid too much. If he is able to build up such a reserve that he loses his head and becomes independent and undependable, then, also, he is being paid too much.

The trouble with the workman, in general, today does not seem to be that he is underpaid. Rather he is in the position where he feels that he has capital at his mercy and he is making capital pay. He is in fact refusing to feed the goose that lays his golden egg. What will he do when he goose can no longer lay?

Canadian Engineering Standards Association

The Canadian Engineering Standards Association was formed early in the present year with the object of carrying out in Canada, for the benefit of Canadian industry, work similar to that done in England by the British Engineering Standards Association, which has proved of such great industrial value. The Canadian Engineering Standards Association is not a Government institution, although it is recognized by the Canadian Government. The members, who serve on its committees gratuitously, are qualified by their technical and industrial standing to represent the interests of manufacturers, engineers and users, and are nominated by such bodies as the Canadian Manufacturers' Association, the Canadian Mining Institute, the Engineering Institute of Canada, the engineering schools of the universities, the railway services, important industrial firms and the great purchasing departments of the Canadian Government. The Association has now been incorporated by Dominion Charter.

A sub-committee has been named with A. A. Dion, Ottawa, as chairman to deal with electrical matters, and already manufacturers, and large users of transformers and various electrical associations have been asked to appoint representatives to meet Mr. Dion, prepare a report and submit it to the Canadian Engineering Standards Association. A sub-committee has also been appointed for discussing the standardization of incandescent lamps, and further committees will be appointed from time to time.

Montreal Harbor Electrification

The Montreal Harbor Commissioners are proceeding with the electrification of the harbor railway and have received bids for the equipment. Eight miles of lines, totalling about 20 miles of track, are to be electrified, from Beaudry Street east to the terminals at Pointe aux Trembles. The western section of the harbor will continue to be served by steam locomotives. A sub-station will be built at Beaudry Street where provision will be made for two units. The plans provide for only one of these being installed at present; this will consist of a 1500 h.p. synchronous motor, direct-connected to two 500 kw. 1200 volt generators, connected in series. In addition there will be the usual switchboard and control equipment. The overhead catenary will be of the standard type. A new transmission line, with wood and steel poles, will be constructed to supply power to the sub-station. Provision is to be made in the same sub-station for an industrial load for the new cold storage warehouse to be erected at the east end of the harbor.

Attended the A.I.E.E.

The following Canadians attended the annual convention of the American Institute of Electrical Engineers at Lake Plaza: G. B. Smith, Belleville; A. E. Davison, D. McKenzie, H. C. Don Carlos, A. H. Hull, Ontario Hydro Commission; John Murphy, Ottawa; F. R. Ewart, Toronto; L. B. Chubbuck, H. B. Dwight, Canadian Westinghouse Company, Hamilton; S. E. M. Henderson, J. C. McFarlane, Canadian General Electric Company, Toronto; Wills Maclachlan, Toronto.

Canadian Electrical Association Convention at Alexandria Bay

Valuable Reports Presented by Sub-Committees—A. Monro Grier, K.C., President Canadian Niagara Falls Power Company, Re-elected President of the Association—Valuable Paper by Mr. F. G. Clark.

The C. E. A. Convention delegates may have found Alexandria Bay a little hard to get at but they unanimously voted it a first-class place to spend a holiday. The Toronto and Hamilton delegations arrived on Thursday morning and the eastern representatives came in during the afternoon. The convention proceedings did not open until Friday morning, so the interval was most enjoyably spent in renewing old acquaintanceships. A good dance hall made the evening pass all too quickly, thanks to a number of lady delegates.

The Friday's sessions consisted chiefly in an introductory address by the president, Mr. A. Monro Grier, K.C., and the presentation of reports by the chairman of the various committees. These are mentioned in more or less detail below. On Friday evening the delegates met together at dinner which was followed by a brief address from the president. Mr. Grier never displayed his unsurpassed command of the English language to better advantage and the delegates were delighted and charmed beyond measure.

On Saturday morning a paper was presented on the subject "Oxygen and Hydrogen as a Central Station Load," which had been prepared by Mr. F. G. Clark. Mr. Fredericks also addressed the delegates on "Service at Cost."

Saturday afternoon was taken up with a meeting of Class A members, when certain private matters were discussed and the officers elected for the coming year. The elections resulted as follows:

President, A. Monro Grier, K.C.
First vice-president, E. A. Dunlop.
Second vice-president, P. T. Davies.
Third vice-president, A. P. Doddridge.
Secretary-treasurer, W. Volkman.

Managing committee, C. S. Bagg, R. J. Beaumont, A. A. Dion, A. V. Gale, J. S. Gould, F. T. Kaelin, D. H. McDougall, R. B. McDunnough, H. R. Mallison, W. H. McIntyre, J. F. Neald, J. S. Norris, L. W. Pratt and J. B. Woodyatt.

Report of Committee on Prime Movers

Steam Power

In Canada, the plentiful supply of electrical energy supplied from Hydro-electric sources and the necessity of conserving the fuel supply of the country during the period of the war has turned the minds of all engineers and manufacturers to the necessity of economy in the operation of steam generating plants and the efforts of designers and operating engineers have been concentrated on improvements in this direction.

Considerable progress has been made in late years in the science of generating steam due to a better understanding of the combustion of fuel and the transmission of heat in boilers.

Mr. F. A. Combe, of the Babcock & Wilcox Co., in a paper entitled "Modern Boiler Practice" calls attention to the fact that though no radical changes in boiler construction have taken place yet improvements have been developed in the arrangement of boiler heating surface due to more efficient furnaces, boiler settings and plant operation.

Present day tendencies favor high steam pressures and temperatures, concentration of power and large unit capacities. The shell boiler has been practically eliminated for this class of service and modifications have been made in the setting and rating of water tube boilers. Existing conditions encourage the use of boilers of high efficiency and rating.

The application of insulating brick in boiler settings is now becoming better understood. It is generally accepted that the walls of a boiler furnace should be built of as few different kinds of material as possible and walls should be well bonded and homogeneous. Recent tendency has been to build walls of solid fire brick.

In order to preserve the furnace side and bridge walls various expedients have been tried. What is required is a furnace lining capable of withstanding the high furnace temperatures and blow torch action; the constant heating and cooling effect and abrasive action of the fuel bed.

Ventilated walls, special refractory materials, steam jets on side walls and high temperature cements have all been used with varying success.

The present tendency is towards higher boiler ratings. One of the principal factors involved in high boiler rating is the coal burning capacity of the grate or in other words stoker and furnace design. Draft loss at high boiler ratings is an important item to be considered and the character of the boiler feed water may readily become a factor in boiler ratings.

We cannot attempt to treat this subject fully in this report. The local test as to whether a boiler is priming lies in the quality of the steam leaving a boiler or in the temperature of the steam leaving the superheater. A recording thermometer on steam outlet from superheater will indicate priming by sharp fluctuations on the superheat temperature curve.

Power dump grates and clinker grinders seem to be coming into use. The Westinghouse Co., and American Engineering Co., have these on the market as well as several other concerns.

The forced draft type of chain grate is now being used more extensively with success in burning low grade fuels high in ash.

Regarding meters, indicators and instruments general progress in their development has been normal.

Higher steam pressures have been tried out in one or two plants in the United States.

The Buffalo General Electric Co. have recently placed in service a plant operating at 275 lbs., boiler pressure, 275 deg., superheat giving a total temperature of 689 deg. F.

The Public Service Co., of Northern Illinois, have an installation operating at 315 lbs., boiler pressure, 225 deg. superheat giving a total temperature of 615 deg. F.

The general impression seems to be that the question of higher steam pressures is a boiler problem and that turbines can easily be designed for operation at the higher pressures.

[A description of the Heine cross drum water-tube boiler was included in the report at this point.]

Steam Turbines

In recent years there has been a marked tendency towards the installation of units of large capacity and during the past two years there has been a marked increase in the U. S. in units of the horizontal shaft type of approximately 30,000 kw., capacity in order to meet the rapidly increasing density of the load. The Prime Movers Committee of the N. E. L. A. in their report for 1919, have included a list of large unit installations which is of considerable interest.

The main sources of trouble in large steam turbine units seem to be in the labyrinth packings and thrust bearings which are apt to cause excessive vibration of parts; the breaking of buckets, dangerous rubbing of stationary and moving elements which in extreme cases may result in permanent deflection of the shafts.

[Here followed a statement by the General Electric Co. with reference to turbine generators; also a copy of the report of the sub-committee on generators of the N. E. L. A. with reference to the matter of fires originating within the generator shell of turbo-generators of enclosed type.]

Water Power-Turbines

During the four or five years period prior to the war the manufacturers of hydraulic turbines made great strides in developing units of high efficiency and simple designs. This was primarily obtained through the introduction of the high specific speed single runner units. During this period a great number of low head plants were built using single runner units of larger size than anything previously attempted. During the last four years, however, the activities in hydro electric developments were greatly lessened and few new features in design have come out, although a certain amount of research work has been carried out the benefit of which should be realized in the near future.

Efficiencies of 92 to 93 per cent. of runners have already been obtained in several plants and we may assume that this is very near the maximum efficiencies that can be expected; but, in order to obtain a maximum over all efficiency of plants, hydraulic turbine engineers are now carefully looking into the design of all passageways from headrace to tailrace. Particular attention is being paid to the design and efficiency of draft tubes for high specific speed runners. The tendency is towards the use of deeper draft tubes with the idea of making the turn from the vertical to the horizontal direction at lower velocities than was previous practice.

It is also generally realized that improvements can be made in the design of intakes especially for low head plants.

There seems to be a difference of opinion as to the number and size of units to be installed in a projected plant; the tendency has been to look upon the water turbine as an almost fool-proof piece of machinery; consequently, plants have been equipped with as few and as large units as possible, thereby making considerable saving in first cost as well as operating expense. Considering, however, that the reliability of a unit does not only depend upon the water turbine but also on the generator and auxiliaries some designers of power plants incline towards comparatively small units with less chance of shortage of power in case of breakdowns. The question as to size and number of wheels to be installed in a plant must, of course, also be decided upon with regard to the transmission system and importance of continuous service.

Runners

The single runner vertical shaft units for low and medium head plants have proven to be of such a success that practically all new plants under this category are now being equipped with this type of units.

Turbine manufacturers are constantly experimenting with higher specific speed runners in order to meet the demand from customers for large units operating under low heads. While a few years ago a specific speed of 100 was considered high, manufacturers claim today to be able to build low head units with a specific speed of 170.

Thrust Bearings

With the increase in size of large vertical water wheels and the consequent increase in weight of the rotating parts, the importance of satisfactory thrust bearings cannot be exaggerated and a great deal of progress has been made in recent years.

The General Electric Company, Schenectady, N. Y., have developed a spring-supported thrust bearing in an effort to overcome certain difficulties experienced in the operation of thrust bearings on this character of service. The main features of the spring supported thrust bearing is that it automatically adjusts itself to unequal loading due to inaccuracies in workmanship or in alignment. A distinctive feature of this bearing is that it will automatically adjust itself while in operation if there is a loss of alignment due to settling of the foundation or to other causes.

The bearing is not affected by wobbling of the shaft. The rubbing surfaces are in a bath of oil and the quantity of oil circulated from an outside source depends on the losses and the cooling conditions. Water cooling coils may be installed in the bearing housing which will reduce the amount of oil and in certain sizes of bearings at low speed, no circulation of oil from a source outside the bearing housing is required.

We have not enough high-class retail establishments. We must make it easier for people to buy electrical appliances.—W. L. Goodwin.

The salient features of the G. E. spring supported thrust bearing are:

A thrust collar keyed to the shaft which transmits the weight of the revolving parts to the rotating ring of the bearings. This rotating ring has a smooth rubbing surface and is so designed that a rapid circulation of oil is maintained.

There is also a stationary ring, the upper surface of which is the stationary rubbing surface of the bearing. This ring rests on springs and to insure flexibility it is made thin and has a radical saw cut through one side.

Sufficient springs are provided so that the stress is only about one half that usually used and the deflection under load is about 0.1 in.

Cooling coils are used to carry off a part of all the heat generated between the rubbing surfaces of the bearing. Centre pins hold the springs in position. An oil well tube is provided which forms the inside annular wall of the oil chamber and is welded to its supporting ring. Dowel pins keep the stationary ring from revolving.

Two of these bearings have recently been installed in the Cedars Rapids plant of the Montreal Light, Heat and Power Consld., in connection with the last two 10,800 h.p. units, and have now been in operation for some months and have given entire satisfaction.

These bearings are designed to sustain a load of 550,000 pounds during continuous operation of the generating units at a normal speed of 55.6 r. p. m. A good grade of lubricating oil well filtered and free from water or entrained air and at a temperature not greater than 13 deg. C. maintained at a level above the sliding surfaces is used and under these conditions bearings can carry 600,000 lbs. without injury.

The cooling coils are placed within the bearing housing beneath the surface of the oil and are of such length, number and size as will keep the temperature of the oil within the bearing housing under 45 deg. C. when supplied with water at 25 deg. C. under all conditions of normal operation. The bearings are capable of operating at a max. runaway speed of the unit, not exceeding 111.2 revolutions per minute of the shaft, for the space of one hour, and the temperature of the oil not exceeding 55 deg. C. The bearings are also capable of starting from rest and stopping as often as may be required by service conditions and are capable of operating at a speed of 10 r. p. m. for a space of one hour, without injurious heating of oil or bearings.

Bearings are designed to suffer no injury due to interruptions of water circulation for space of one half hour under otherwise normal conditions or for a space of 20 min. not exceeding 50 per cent above normal speed.

The general construction of these bearings is such as will allow the bearing all its parts to be removed from the bearing housing without disturbing the generator or waterwheel except by supporting the turbine shaft and generator by independent means provided and the removing of the thrust block keyed to the top of the shaft.

These bearings are the first ones of this size to be equipped with water cooling coils for circulation of cooling water instead of using oil circulation.

The Kingsbury thrust bearing has already been described to a great extent in many engineering periodicals and shall not again be treated in this report. It may be of interest, however, to the members to know that this type of bearing has been adopted by the Hydro-electric Power Commission of Ontario for the Westinghouse generators on the Queenston development. They are designed to carry a load of 900,000 lbs. at 187½ r. p. m.

Governors

No radical departure from standard designs of governors, mechanical or hydraulic, have taken place recently. The tendency has been in the past to specify quick acting governors in order to maintain a constant voltage. This tendency may lead to serious troubles, particularly where the turbines are connected to long penstocks, which are not protected by relief valves or surge tanks.

Designers are aware of this danger and considerable attention is now paid to this problem.

Troubles encountered in governor systems, such as corrosion of pipe lines and governor parts, where water is used as operating fluid, are being met by the introduction of soluable oil barium hydrate and potasium bichromate into the operating fluid.

There still seems to be a difference of opinion among designers as to the advisability of using individual governor systems or to have all governors receive the operating fluid from a central pumping system. The latter system is, as a rule, the cheapest and when the necessary care is taken in laying out pumps, pipe lines, etc., very satisfactory from an operating point of view.

A noticeable improvement has taken place in recent designs of water turbines with regard to accessibility, thorough lubrication and easy cleaning of turbine parts. One of the important features of the single runner vertical unit is the easy removal of gate mechanism for inspection as well as the easy adjustment of guide vanes.

(Signed) S. Svenningson (Chairman)
A. H. Wilson,
A. J. McDougall.

Report of Meter Committee

To the President and members of the Canadian Electrical Association:

Gentlemen:—

Your committee this year has decided to depart from the established precedent of the Association, and instead of preparing a report of a technical nature to present the following, with a view to opening a discussion.

In view of the fact that the greater part of the revenue of operating companies derived from the sale of electric power depends upon the accuracy of the electric meters, your committee this year has decided to discuss the present commercial methods of re-calibrating and government inspection of meters. The accuracy of calibrating commercial meters depends fundamentally upon the maintenance of accurate standards. At present the standard meters are calibrated from time to time in various isolated laboratories, either maintained by the operating companies themselves or by the universities, and in some cases by the government laboratories, and the frequency of testing these standard meters rests at the discretion of the individuals in charge of the meter departments of the various operating companies. It is well known that different companies have different equipment for the calibration and standardization of their various instruments, varying more or less in accuracy. We believe it would be very much to the advantage of the company members of the Canadian Electrical Association if, instead of each company maintaining a primary standard laboratory that arrangements be made whereby more use could be made of the beautifully equipped and very little used government laboratory at Ottawa, which we presume was equipped with surplus revenue from meter inspection, and therefore should be devoted to the benefit of the companies who supplied it. At present it is possible to send instruments there and have them tested, but as so little use is made of it by the public the routine for handling them with dispatch is not given very much attention. At the same time, we feel that this is not the fault of the government, but that of the companies for not having instituted arrangements whereby more use is made of these facilities. The use of this laboratory by all Canadian companies would not be practical owing to extreme distances from Ottawa. However, it might be possible to arrange that government inspectors with primary standards which are portable make periodic visits to the plants of the various companies and check their working standard. In making this suggestion we do not feel that we are asking the government for anything we are not entitled to, as the understanding has always been that the revenue derived from meter inspection was for the purpose of covering the expenditures in connection with inspection, and as the government blue book for year ending March 31, 1918, shows a surplus of revenue over expenditures of $35,019.47, a surplus revenue such as this should not only permit of a reduction of rates, but also the establishment of a very complete system of government checking of secondary standards and cover the expenditure in connection with the checking in the laboratories at Ottawa of any standard meters required at a very much lower rate than at present exists.

It has been brought to our attention that there is a movement on foot by the Hydro-Electric Power Commission of Ontario to delegate the work of testing and sealing meters to the various provinces, thus taking it away from the Canadian government and incidentally, we presume, allowing the Hydro to escape from paying a tax which would be chargeable to competing companies. This, to our minds, would be a serious mistake, and we feel it our duty to object strongly to any effort of this kind, and would suggest that this association should go on record to the government against it, as if the work were delegated to the different provinces the meter manufacturing concerns would be obliged to comply with numerous conflicting requirements, involving more or less unimportant details and the standards for the different provinces would most likely vary to such an extent that the meter manufacturers would find another reason for increasing the present high cost of integrating meters. At the same time, we feel that a determined effort should be made to have the Dominion Government improve their present system of meter inspection, as at the present time, besides being expensive, inconvenient and unsatisfactory, it offers very little protection either to the companies or the public, and we question if, outside of moral effect, it has any use whatever.

There is at present being organized in Ottawa a committee of standardization of engineering standards. They are undertaking the standardization of tungsten lamps and machinery and equipment of different kinds, and we believe that they should be petitioned with a view to having them arrange for a committee on the standardization of integrating watt meters with the view to having dials, connections, etc., made standard with all manufacturing companies.

During the past year there has been considerable discussion with regard to the changing of power circuits from twenty-five cycles to sixty cycles and vice-versa. One of the member companies who has changed from twenty-five to sixty cycles has succeeded at very small expense in altering his twenty-five cycle meters to operate at sixty cycles.

Your committee further recommends, in view of the importance of commercial electric meters and all questions appertaining thereto, and in consideration of the highly technical nature of some of these questions that a permanent committee be formed, the personnel of which should be one member from each interested operating company to constitute an organization for the collection and distribution of data and experiences in connection with electric meters.

In order that a means may be provided for the proper operating of such a committee consisting of members from different parts of the country, it is further recommended that it shall be considered the bounden duty of each member of the permanent committee to send a report covering all items of interest pertaining to the subject of meters to the secretary of this committee between the 1st and 10th of every month. It shall then be the duty of the secretary of this committee to edit these reports and combine them into one paper of more or less general interest, which may be presented at the annual convention, or, if desired, printed and sent to all interested companies before the convention.

With reference to the discussions of last year's meter committee at the annual meeting, we have been informed recently that as a result of this some of the meter manufacturers are contemplating putting on the market shortly a kv.a. meter.

Respectfully submitted,

E. J. Turley, chairman.
E. R. Spence,
P. S. Gregory,
Louis W. Pratt,
A. H. Winter Joyner,
Wm. Volkman,

The great problem of the electrical industry of the future is the commercial problem.—W. L. Goodwin.

Report of Committee on Electrical Apparatus

Turbo Generators

One of the side issues brought into existence by the sustained overloads carried during the war service is the question of fires, their origin and the best means of handling them, and in view of this a questionaire was circulated by the Sub Committee of the N. E. L. A., early this year, giving the following results:

Some thirty companies reported 81 fires in the past five years, 21 fires equally divided between 60 and 25 cycle units, were specifically described occurring in units ranging from 3,300 to 35,000 kw. and from 2,300 to 13,200 volts.

About an equal number of fires appeared to have started within the insulation and external to the insulation. The greater proportion of fires external to the insulation seems to have occurred on 3 phase systems operating without a grounded neutral. Other causes are many, principally short circuits and grounds, with the remainder from mechanical causes, eddy currents, moisture, etc.

The consensus of opinion is that more frequent inspection and cleaning of the generators is very desirable and has a direct bearing on the liability to fires from sources external to the windings. Too many companies appear to trust the air washing devices for this work, but even with the best possible apparatus, air and grease creep in, fluff and dirt accumulate and conditions for potential fires exist. Good practice, therefore, would indicate periodical cleaning, and we would invite a full discussion on this point.

The grounding of the neutral of 3-phase systems solidly or through resistance, is rapidly becoming standard practice on both 25 and 60 cycle throughout the country.

Twenty-one of the thirty companies replying favor this method of operation; five operating with solid ground system, preferring to operate through resistance; three companies opposed the grounding of the neutral. The consensus of opinion seems to be that grounding is very desirable and, in addition to other advantages, has a considerable effect in the reduction of generator fires occurring external to the insulation of the conductors.

It is also rapidly becoming standard practice, particularly on large units, for the manufacturer to bring out both ends of each phase winding to the generator terminal board so as to permit the installation of current transformers between the terminals of phase windings and the neutral of the coils. The current transformers can be connected differentially with respect to the instrument current transformers in the leads between main oil switch and generator, so that in the event of a fault in the generator or its leads the balanced relay will immediately open the main oil switch, the neutral switch if closed, and, after slight delay, the field switch.

Twenty-four of the thirty companies reporting approve the installation of balanced relay protection and have adopted it as standard practice on all new generator installations and on older generators where the expense involved is not too great.

The modern type of turbo-generator is usually completely enclosed and the blower action of the ventilation is such that fires are apt to become serious and very difficult to extinguish. As in the case of most fires the time element is the main factor in controlling it, it is especially important to apply the extinguishing medium as promptly as possible, and as close to the seat of trouble as can be done without permanent injury.

This leads to the question of ways and means of fire fighting. Water, steam and carbon-tetra-chloride are looked upon with favor, the standard ways of applying being to pipe these mediums up to the end bells and provide a stand by service.

Sub-stations

The outdoor type of sub-station is rapidly being adopted for both industrial and distributing purposes. Some companies are using self-contained out-door metering outfits, and report practically no trouble with them. Other companies are using small structures for switches and meters, while others are using all weather-proof apparatus.

The use of single-phase transformers for three-phase banks is still general, but in many cases, particularly in limited quarters, the 3-phase transformer is becoming more popular.

The general practice appears to be to install transformers of just sufficient capacity to carry the load and use water cooling and spraying for over loads.

For protection of customers' sub-station the practice varies from over-load relays on the main oil switch and fuses in each transformer to the practice of one large company in the Southern States, which treats transformers for 11,000 volts and upwards as part of the line, and provides no protection. We understand they think they are justified by the results obtained.

The automatic sub-station for direct current is growing in popularity. There are at present on d.c. railway service seven sub-stations of 1,000 kw. or over and 49 sub-stations between 300 kw. and 600 kw. All have been operating automatically or semi-automatically for some time, but apparently only one company operates automatic sub-stations in a 3-wire d.c. system. The d.c. automatic sub-station is here to stay, and engineers would do well to investigate it thoroughly as an economical proposition. We believe we are correct in saying that the manufacturers are prepared to produce reliable automatic apparatus when it is called for.

Automatic or semi-automatic a.c. sub-stations are in continuous operation, some being straight outdoor type and some part outdoor with switching and metering buildings. These substations usually consist of step-down transformers without out-door type potential regulators. In some cases automatic re-closing oil circuit breakers are used. These will open and close a circuit several times in a few seconds. After the third time of opening the circuit remains open until re-set by hand. Apparatus in automatic sub-stations should be more liberally rated than is customary and should be of the most rugged construction.

As sub-station appartus, the rotary converter with a capacity of about 400 kw. appears to be about the upper limit in this class of machine. With the extension of the use of 60 cycle as a system frequency the 60 cycle rotary has come more into prominence, although at times on railway service flashing is troublesome. The use of flash guards, arc cooling devices and high speed circuit breakers is expected to bring them up on a par with 25 cycle machines.

Remote control, electrically operated d.c. circuit breakers are generally used on large rotary converters and in many cases remote control starting switches are also used.

Ventilation of Rotary Converters

For ventilation of large rotary converters most companies depend on the ventilation of the sub-station room; only one company operating a large number of rotaries in basement sub-stations uses a combined pressure and exhaust air system and has considered partial housing of the machine for artificial ventilation. Also one company brings air from the air chamber for its transformers through some spare ducts and, by means of baffles, directs the air around the machine. Blowers giving approximately 1½ oz. pressure will usually have a capacity for both purposes.

In summing up the rotary converter practice we find that in large inter-connected a.c. transmission systems some companies using relatively small-sized converting units prefer motor-generator sets, but companies with large converting equipment of 200 kw. and above prefer rotaries on account of the efficiency and convenience over large range of loading.

The general policy of operating all banks of transformers and distribution feeders on one bus with an auxiliary bus provided is maintained. The capacities so connected are running considerably higher than 10,000 kv.a., and this brings up the question of the rupturing capacities of oil switches; in order to avoid considerable expense in changing over apparatus, as well as possible switch destruction, the use of reactors would seem desirable. Considerable difficulty exists in the determination of what constitutes the rupturing capacity of an oil switch; also the time element which should elapse before closing and re-opening the switch, as most oil switches are rated on a two-minute basis. This would seem to eliminate the use of automatic re-closing devices.

In view of the difficulties confronting the manufacturers in obtaining sufficient concentration of power for the testing of larger breakers and in view of the value which could be derived from evidence as to the successful or non-successful functioning of breakers under actual short circuits it is recommended that the operating companies make reports of such occurrences of importance to the manufacturers of the breaker, giving such data as will enable him to determine what service the breaker performed. Of such importance is this question that your committee would suggest co-operating with the switchboard sub-committee of the N. E. L. A., in view of using a standard report form which that sub-committee contemplates devising. The chairman of the committee by this co-operation should be in a position to advise the member reporting if similar troubles or successful results have been experienced with breakers of the same type.

Your committee at this point feel it desirable to call attention to the neglect which is usually the lot of the air break switch and would point out the danger of abnormal temperatures which are liable to be caused by oxidization creating bad contacts. The high tension air break disconnecting switch is particularly liable to this neglect, being usually placed out of ordinary reach and left to take care of itself year after year. We feel that these switches will repay the attention given them.

Your committee feel that in view of the work in connection with the standardization of constant potential transformers and the lead markings for the same that has been done by the general conference committee on technical subjects, representing the American Institute of Electrical Engineers, the National Electric Light Association. The Electric Power Club and the Association of Edison Illuminating Companies, and in view of the fact that these standards are being accepted by the manufacturers, that they would recommend the tentative adoption of this report as a basis for the establishing of these standards for Canada or the adoption of the report in toto if found desirable.

Your committee feel it is the duty of this association to assist in the establishment of international standards if they can be adopted by our country without sacrificing our interests and append herewith the report of the standards as revised in 1919 for your approval.

(Signed) J. F. Neild (chairman).
W. H. McIntyre.
C. J. Porter.
M. D. Schwegler.
J. S. H. Wurtle.

Report of Committee on Power Sales

President and members of the Canadian Electrical Association.

Lighting Sales

During the period under survey there have not been any marked developments in this phase of the work. The absence of development is probably due to the pressure of war work. However, one particular fixture is rapidly gaining a certain amount of popularity and is a form of semi-indirect lighting which is patricularly interesting in that it allows of the use of Nitrogen-filled lamps for domestic lighting, thus making it of great interest to Central Station companies as a means of increasing load.

Industrial lighting, on the other hand, shows considerable development and probably for the same reason, pressure of war work in the extensive production of munitions. In certain places in England and the United States it has been found that surprising results have been obtained by the way of increased production due to correct and improved lighting.

For specific details as to the actual work done we would refer to the proceedings of the Illuminating Engineering Society, but would here emphasize this matter as being of the greatest value to lighting companies as a direct means of immediately increasing revenue.

Very little development has taken place in this field except the growth of the use of ornamental underground lighting systems, fed by armoured cables taking advantage of the flexibility afforded by the incandescent nitrogen-filled lamps.

The quetsion of rates on long-term contracts made some few years ago is in some instances seriously affected to-day by the high cost of lamp renewals, so much so that it would appear in some cases that the systems can barely bring in a return sufficient to cover a small interest on the money invested, and some central stations are basing rates with lamp renewals as a definite extra variable.

In connection with daylight saving, one of the most interesting subjects for consideration during last year, it may be said that to-day the lighting companies are in a position of knowing the worst and that daylight saving, from the point of view of decrease in revenue, is, after all, not a very serious thing. At the outside, the effect on lighting earnings over a year does not exceed a figure of 5 per cent., which checks up very reasonably with the estimated reduction.

Power Sales

The sale of power during the period of consideration was, in the early part, more or less normal. However, there was not any very marked increase by the way of establishment of large plants, such as occurred previous to that time. The signing of the armistice, of course, seriously affected the sale of power, and to a less extent, the amount of power used.

With regard to the amount of power used, in almost every case where large systems are concerned it was found that the decline in load did not at all assume serious proportions previously estimated, and that in some cases where a wide service of large capacity was delivered the amount of power delivered was practically only reduced for the period between the signing of the Armistice and the end of 1918.

The present time is one of development, stabilization and return to pre-war conditions. Numerous projects covering a wide variety of productions, are under consideration, and fro mthe power sales point of view there is considerable work to be done. The immediate future holds a promise from the power sales point of view there is considerable in smaller blocks than during the war period, but covering a much wider range of products.

To meet this coming demand most of the larger power companies in Canada are either constructing plants or preparing designs ready to construct plants.

The use of the electric stove is more than ever rapidly increasing. The designs of the stove offered have not during the past year, to any extent, shown any extraordinary radical changes or new developments, except in so far as continuous and increased efficient service is concerned, such as is effected by an element having a longer life and slight modifications in structural design.

The question of the fact of an electric range load on a distribution system built for lighting is now rapidly becoming known, and to the minds of most engineers, is shown by careful load survey to be very satisfactory from the view point of diversity.

The average central station manager, until lately, was rather inclined to view the electric range as perhaps a good thing to have on the system in small quantities, but to a certain extent, feared what the result might be in considering that apparently a large range load would mean a tremendous expenditure in lines and transformers.

Practically, however, due to the diversity, the rapid installation of the electric range has not resulted in any such conditions as at first thought. The diversity has been found to lie between the limits of 10 and about 30 per cent., and for the average system having over 100 ranges connected the diversity factor will not exceed 15 per cent. The average demand for one stove does not often exceed forty per cent.

It is the opinion of this committee that if some means could be found whereby the cost to the consumers of the stove could be considerably reduced it would considerably increase the use of the electric stove.

Another point to be considered is that the range demand on a system seldom overlaps the lighting peak. This definite knowledge regarding the diversity factor of the range load cannot but result in the central station manager pushing the installation of electric ranges more than ever.

The question of the cost of a range forms an interesting study. There is no doubt there exists room for what might be termed the "Ford of the electric range business," and if a range could be sold to the central station to-day at about $60.00 it would add a great stimulus to its use. This range could be sold to people of very moderate means, such as mechanics, factory workers, etc. There exists, of course, the need for the higher priced ranges and as time goes on we find that amongst discriminating buyers of more extensive means the higher price ranges are easily sold and are actually in great demand.

The business of selling electric stoves is still, to a certain extent, clouded by the fact that there does not exist on the market, to our knowledge, a water-heater that will give absolute satisfaction. The manufacturers of water-heaters, in some cases, seem to have done everything that can be done to cover the situation, but there are so many difficulties to be overcome, the question of impure water being probably the most serious and a trouble that we can hardly lay at the door of the manufacturers.

However, a heater has been designed to overcome this, known as the "Clampon" heater, in which the element is fastened directly to the outside of the circular hot water tank.

Synchronous Motors

Synchronous motors are rapidly coming into popular use, and in the opinion of this committee, rightly so, as the judicious use of this type of motor both from the point of view of the power company and the consumer is a step in the right direction.

This particular type of motor is, of course, broadly, only practicable in the larger size of the motors, being perhaps more complicated from the operating point of view. However, their usefulness in this sphere of the work fills a great demand. A motor of medium, say three to five hundred horse power, has great value in correction of power-factor on a system of fair size where the power factor is of fairly high value, say about eighty, and, we may by this use easily effect an improvement of at least ten per cent., thus making existing generating or transformer equipment of greater value to the power company and proving likewise beneficial to the customer in freeing him from penalty for low power-factor under the penalty clause.

The practice of making rebates on the power charge by giving a bonus or arranging a sliding scale with the customer is sometimes resorted to. For example, a range of from eighty-five to ninety per cent. power factor may be taken below which figure the power factor clause operates, and above the higher figure the customer commences to receive rebate on his power charge.

This practice is hardly to be commended as in the average case of a contract of this nature the amounts of power are fairly large and the customer usually has miscellaneous equipment and can, in some cases, practically run his plant at unity power factor, a condition not often considered at the time of making a contract. In cases where a customer has to run of necessity in certain classes of manufacture a small steam plant, it can be readily understood what possibilities such a bonusing scheme offers.

The object of the penalty clause and the use of the synchronous motor is to bring the power-factor as near unity as possible and so make maximum use of all electrical equipment, but it is not primarily to be thought as a method of giving lower power-factor rates.

While talking on the subject of synchronous motors, we recommend the close attention of manufacturers to this subject with the idea of standardizing designs and reduction of cost.

One of the difficulties met with at the present time in connection with the propositions where a fairly large amount of transmission line work is involved is that the present high cost of labor and materials make resultant rates for power much higher than previous years, and when compared by prospective users with rates of a few years ago, do not appear to them to be at all satisfactory. Unfortunately at the present time there do not appear to be signs of any great relief from this situation.

In connection with transmission of large amounts of power over fair distances high voltages are now being given serious attention by engineers, and voltages of 200 kilovolts, and more seem to be going well within the range of construction and standardization. The same remark may be said of turbine and power generating units.

It might here be mentioned that 1918 saw the completion by the Shawinigan Water & Power Company of the longest transmission span yet constructed, this being some 5,000 feet between tower centres carrying a three-phase circuit with wires in horizontal plane fifty feet apart.

The subject of arc furnaces does not present any great advance from that indicated in our report made last year with the exception that a number of large size furnaces used in the manufacture of carbide and ferro-silicon, are continually being added. The arc furnace field, however, has recently seen the partial development of a three-phase furnace for the fixation of nitrogen, which promises well for the future.

(Signed) R. J. Beaumont (Chairman)

Oxygen and Hydrogen—A New Source of Revenue for the Central Station

By Mr. F. G. Clark[*]

On the assumption that a diversity of loads is the first requisite of a central station, the next would be a high ratio between the average load and the peak load. The attainment of a high load factor with diverse types of load is one of the main problems of a central station management.

It is not my purpose to discuss this problem, but to set before you the facts relating to one specific proposition capable of smoothing out the rough curve of a variable load, and of filling the valleys between the peaks of the load at the generating plant. The electrolytic cell suggested for this purpose functions, with respect to power supply, the same as a storage battery on charge, and so long as its input rate equals the load variations, can be made to regulate just as well as the battery. The cells may be so controlled as to follow the rise and fall of a peak so that approximately 100 per cent. load factor may be maintained upon the generating plant if that is desired.

The value of regulation of the load curve is well understood by central station managers, but increasing the load factor introduces many complications, most of which are peculiar to each particular system and must be separately considered. I will not attempt a general discussion of these matters, but shall refer to one phase of the question, which can be viewed in a new light, the supply of power to street and interurban railways, and the electrified sections of steam railroads. Neglecting for the moment, the last mentioned, we find that whereas a decade ago practically all electric railways generated their own power, often at excessive cost, due in part to their very low power load factor, they are, to an increasing extent, becoming customers of the central station companies. The central station sells three phase, alternating current to the railway in bulk, and the railway converts and distributes it from its sub-stations. An annual load factor of 30 per cent. and a daily load factor of 40 per cent. is about the average for street railways. Mingled with the diverse loads of a central station, these factors may be equated to 40 per cent. annual and 50 per cent. daily, but this is about the best that can be done. Storage batteries would benefit the load factor, but cannot be considered in this connection, by reason of their 60 per cent efficiency and the fixed charges.

Electrolytic Cells

Electrolytic cells of the type here considered have been designed with special reference to operation where the electrical input is variable and subject to rapid and violent fluctuations.

The thermal efficieny of the cells previously used varies from 28 per cent to 33 per cent. with current flowing at the rate of .1 ampere per sq. in. of diaphragm surface between electrodes. That of the new cell varies from 25 per cent. to 35 per cent., with current varying from .5 to 4 amp. per sq. in. of diaphragm surface between electrodes.

The usual method of expressing cell efficiency is to ratio the actual voltage per cell with the decomposition voltage of water between platinum electrodes. This is not a true measure of efficiency, but upon this basis present cells with .1 amp. per sq. in. operate at 80 per cent. to 85 per cent efficiency, and with 1. amp. per sq. in. at 40 per cent. to 60 per cent. efficiency. The new cell gives the following efficiency:

At .1 amp. per sq. in. .... 95 per cent.
" 1. " " " " .... 89 " "
" 2. " " " " .... 89 " "
" 4. " " " " .... 60 " "

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[*] Chief engineer Toronto Power Company.

The installation costs of large-sized plants equipped with existing types of cells, including building, but exclusive of electrical generating or converting apparatus and compressors, will not be less than $750 per kw. of electrical input, and will generally exceed $1,000 per kw.

The installation costs of the new cells, including building, but exclusive of electrical apparatus and compressors, will, for similar plants, be approximately $50 per kw. of the normal electrical input.

The efficiency of the new cell at its normal rating is about the same as that of the present cells, which is 80 per cent. referred to platinum electrode decomposition, or 30 per cent. thermal. By decreasing the current rate per unit of diaphragm to the normal rate of existing cells, the efficiency increases, and by increasing the current rate to double the normal rate, the efficiency drops to 60 per cent. dissociation or 25 per cent. thermal. The new cells may be operated at this high rate, though it must be understood that the cost of electrode and diaphragm renewals must be taken into consideration. Operation at twice the normal rate reduces the installation costs per kw. input by one-half.

Maintenance and Renewal Costs

We may assume that the maintenance costs on cells and building is, for existing cells, 2 per cent. per annum. The maintenance costs of the new cells depend upon the gas output, although skill in operating the cells has a bearing upon these costs. The results of two years of operation indicate the following.

	Percentage of total costs for maintenance and renewals
When average rate is .5 amp. sq. in.	3 per cent.
" " " " 1. " " "	5 " "
" " " " 2. " " "	8 " "
" " " " 3. " " "	13 " "
" " " " 4. " " "	20 " "

Interest, depreciation or amortization and taxes are taken at 10 per cent.

The attached sketch has been prepared to indicate the typical loads of a city of about 250,000 inhabitants.

The railway company generating its own power, would require four 3,000 kw. units. The electric light and power company, for its own uses, would require four 5,000 kw. units; if it were to supply power to the railway company, one additional 10,000 kw. unit would be needed. It may be taken as an accepted fact that the railway company's load can be furnished more cheaply by the power company than it can be generated in its own plant, so that the carrying charges of the railway plant are probably the determining factor in the arranging for a sale of power by the power company.

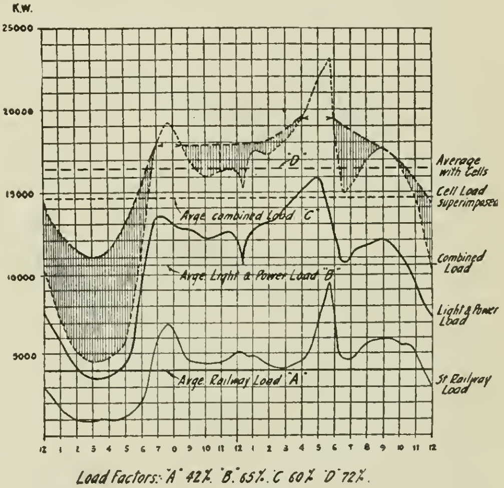
Looking at the railway curve, you will see that it might be possible fo rthe power company to sell the railway requirements up to 7,000 kw., in which event their own plant would be in use only a few hours per day. It is doubtful, however, if this would produce any net saving over the purchase of all the power required. I might suggest that if hydro-electric power were being considered, then the steam generating plants would not be required except as stand-by reserves, or to carry the seasonal daily peaks.

While these and many other considerations have a bearing upon the question of purchase by a railway company, and sale by a power company of power for railway operation, it may well be some other factor that will turn the scale into a profitable undertaking for both parties, and my somewhat lengthy preamble brings us to this point.

Cost of Kilowatt-Hours

It is a well-known fact that kw.h. generated in a plant do not cost alike. The peak kw. h. cost the most, and the off-peak or night kw. h. the least. If the load curve were a straight horizontal line, each kw. h. would cost the same as every other one; but even in this case, unless all of the kw. h. were used in the same way, their value for sale would not be equal. Let us suppose, for example, that the power company was able to sell to a user of power those kw. h. shown on the sketch as the cross hatched area. The effect of this would be to raise the load factor from 60 to 72 per cent., and in doing this the power company would hold control of the power delivery at all times. The kw. h. certainly do not cost the power company anything for generating capacity, and, if supplied to the railway company, nothing for transmission capacity. The cost, therefore, will be the coal, labor and maintenance costs attributable to those particular kw. h.

It is a well known fact that the operating costs of the kw. h. generated between 1 and 5 a.m. because of the low load on the plant, is greater than for the kw. h. on peak, so that if the night valley be filled up the extra kw. h. should not carry any fixed charges, and their total cost should approximate the operating cost of the peak kw. h. As a matter of fact it can be proved that they cost less.



Illustrating the use of 3000 kw. of electrolytic cells on combined electric load of a city of 250,000 population

Let us see how this works out by referring again to the sketch.

	Peak	Average	Total	Load Factor
Railway load	9,500 kw.	4,000 kw.	96,000 kw. h.	42 %
Light and power load	16,000 kw.	10,500 kw.	252,000 kw. h.	65 %
Combined load	23,000 kw.	14,500 kw.	348,000 kw. h.	60 %
Adding cell load	23,000 kw.	16,500 kw	396,000 kw. h.	72 %

With coal at $4.00 per net ton, and labor at 1919 rates.

	Fixed Cost	Operating Cost	Total Cost
Railway load	$.0030	$.015	$.0180
Light and Power load	.0024	.010	.0124
(a) Combined load	.0020	.009	.0110
(b) Total load	.0020	.0075	.0095

(a) The fixed charge of the railway steam plant not included.

(b) No additional plant required.

It appears that the off peak power superimposed upon the plant costs $.0075 per kw. h. If this off peak power can be so used that it will net the power company $.0075 per kw. h. they can afford to sell to the railway at $.01 per kw. h. As a matter of fact the sale would probably be at so much per kw. of peak per month or year, with an energy charge for the actual energy taken, producing in a year a return equivalent to one cent per kw. h.

Selling D.C. to the Railway Company

It is suggested that the power company shall sell d.c. instead of a.c. power to the railway company, and take over the sub-stations for this purpose, charging for the d.c. power the equivalent of 1.25 cents per kw. h. to cover fixed charges and losses.

Having these sub-stations in charge, the power company should install electrolytic cells and operate them from the d.c. buses as off peak power users and regulators of load on the generating stations.

Let us assume that there are four sub-stations, each of 3,000 kw. capacity, and that in each the following cell installation is made:

1 electrolytic battery, 1,000 kw. normal.
1 oxygen compressor.
1 hydrogen compressor.
1 water still.
Fixed tanks, spare parts, etc.
3 installations, $150,000.

These cells will average 66 per cent of the normal rate, but will at times be operating at nearly twice the normal rate

The costs per day would be:

Fixed charges on cost at 10 per cent.	$41.00
Maintenance at 8 per cent.	33.00
Labor and materials	60.00
Power	43.50
	$177.50

The gas manufactured per day would be:

99.5 per cent. pure hydrogen	336,000 cu.ft.
99 per cent. pure oxygen	168,000 cu. ft.

Cost of both gases 35.25 cents per 1,000 cu. ft.

Liquid air oxygen 97 per cent. pure costs $2.00 per 1,000 cu. ft. and at 1,800 lbs. pressure, in cylinders, sells at from $12.00 to $20.00 per 1,000 cu. ft.

Electrolytic oxygen, when impure, contains hydrogen, a heating gas, giving out over 300 heat units per cu. ft. when burned in the air. When oxygen is used for welding or cutting, 3 or 4 per cent. of hydrogen is not a disadvantage, and simply results in less oxygen per unit of holder capacity. Hydrogen as an impurity in oxygen, beyond 10 per cent. produces a mixture which tends to become explosive, and becomes more dangerous as the hydrogen content exceeds 10 per cent of the volume.

Impurities in Oxygen

Liquid air oxygen, on the other hand, contains nitrogen, an inert gas, as its impurity, and this impurity is seldom found less than 3 per cent. Although this impurity tends to render the oxygen more and more safe to handle as its content increases, it renders the oxygen less and less valuable in much greater proportion. Exhaustive tests in welding and cutting with the oxy-acetylene torch indicate that oxygen gas containing two per cent. of hydrogen is 20 per cent better than oxygen gas containing two per cent of nitrogen.

When both gases, or rather, the total gas, costs 35.25 cents per 1,000 cu. ft. the oxygen alone will cost $1.06 per 1,000 cu. ft. In that case the hydrogen is free, and can be sold for any price that will cover the expenses of sale.

The present use of oxygen gas in the U. S. alone exceeds 5,000,000 cubic feet per day, or 1 cu. ft. per 20 inhabitants. If the use were uniformly distributed according to population, a city of 250,000 people would require 12,500 cu. ft. per day. The use of oxygen is confined to manufacturing towns and cities, and particularly to those engaged in certain lines of manufacture.

The requirement of a city of 250,000 may not exceed 12,500 cu. ft. and it may be in excess of 500,000 cu. ft. per day. A canvass of the manufacturing establishments will soon disclose the actual needs, and the use of oxygen will increase as its cost decreases.

Hydrogen cannot be used for welding iron or steel, although it can be used to a limited extent in the welding of other metals. In the oxy-hydrogen torch it is an excellent cutting agent, and when a great deal of cutting is necessary, as in a steel fabricating plant or a shipyard, should replace the oxy-acetylene torch for this purpose.

Uses of Hydrogen

There are a number of present uses for hydrogen, and its future in the arts is an array of possibilities almost staggering the imagination. It is used in the hardening of oils and fats as in soap works. It is used in glass blowing as a heating agent. It is used in the laboratories of manufacturing plants and colleges as a reducing agent.

All of the above uses are predicated upon hydrogen at a cost of from fifty cents to two dollars per 1,000 cu. ft.

If the plant we have been considering were treating hydrogen as the product and oxygen the by-product, the cost of hydrogen would be fifty-three cents per 1,000 cu. ft.

When both gases are saleable products to the capacity of the plant, their respective costs should be based upon the relative values of the two gases, in which event oxygen would always be worth at least twice as much as hydrogen, and the costs would be, for oxygen fifty-three cents and for hydrogen 26.5 cents per 1,000 cu. ft.

A company manufacturing oxygen, with hydrogen as a by-product, may dispose of the hydrogen in bulk in two ways, reserving the privilege of withdrawing any portion that can be sold at higher prices to manufacturers who can use it in their processes.

Hydrogen burns in the air to form water, and for every 1,000 cu. ft. of hydrogen thus consumed, 305,000 heat units are liberated.

The heat standard for illuminating gas is 585,000 heat units per 1,000 cu. ft. and this gas is made by the retort or water gas process. Coal gas, as usually made, will absorb from 5 to 15 per cent of hydrogen, without lowering its heat value below standard. Water gas, when burned, liberates 308,000 heat units per 1,000 cu. ft. and at present costs for coal and labor in a plant supplying a city of 250,000, can be made for from 15 to 20 cents per 1,000 cu. ft. We may, therefore, take 15 cents per 1,000 cu. ft. as the value of hydrogen gas, delivered to a gas company.

Hydrogen as a Heating Fuel

Hydrogen gas may be used as a heating fuel, and be burned under boilers or replace gas in the heating appliances of manufacturers, or, by suitable changes in existing apparatus, be burned in retorts and circulated through the heating coils or radiators of the heating system of a building. The hydrogen must economically replace coal or gas when used as a heating agent. When 600 b.t.u. gas is used, the hydrogen has a value one-half that of the gas.

Where coal is used, the situation is complicated by consideration of space and labor saved, coal and ash handling eliminated, general cleanliness, and where soft coal is used, freedom from smoke.

I consider that the gas has a minimum value of twelve cents per 1,000 cu. ft. where hard coal, costing $10.00 per net ton, is used, and a value of seven cents per 1,000 cu. ft. when soft coal, costing $4.00 per net ton, is used.

The price for use in heating buildings will depend largely upon the results obtained and the value held by the purchaser of the many factors having a bearing. In connection with a lighting and power contract and the replacing of an isolated lighting and heating plant, the gas may have a value of forty cents or more per 1,000 cu. ft.

Work is in progress relating to the development of processes for the production of large quantities of hydrogen, based upon the electrolytic cell and the use of larger quantities of hydrogen in the production of standard marketable products. The work has advanced to a point where I am warranted in asserting that the electrolytic production of the gases oxygen and hydrogen will shortly be of considerable import to industry in general.

Prospects are Good

In a statement of this kind which must necessarily be concise, I can do no more than hint at the possibilities, as much of the work we and others are doing along the lines of research and development have not yet reached the final or commercial stage. I can only suggest that the prospects are very good for the announcement of one revolutionary proposition in the near future.

The foundations of the revolutionary change are the gases oxygen and hydrogen, and the keystone of the arch is the electrolytic cell.

The Toronto Power Company is preparing a bulletin containing full information regarding the cells and detailed information will be given to those interested. I might add that the Toronto Power Co. operates one of the hydraulic plants on the Canadian side at Niagara Falls, and a steam plant at Toronto. The combined peak load capacity of its plants is 185,000 h.p. In 1915 the company established a research department, having for its purpose among other things, the increasing of the load factor of its system, and incidentally of its revenue.

Finding that the manufacture of the gases oxygen and hydrogen by the electrolysis of water was a promising proposition and that there was no apparatus on the market suitable for use on a large scale, having regard to the economic features, the research work was at first concentrated upon the development of a type of cell which would meet the requirements.

The result of this development is a type of electrode construction permitting operation at high current densities and high temperature. Cells of this design have been in operation at the company's Toronto plant for over two years, having, in this time, fully demonstrated their commercial practicability.

The value of the electrolysis of water to the Toronto Power Co. will consist of the sale of oxygen and hydrogen at prices sufficient to cover the costs and carry a reasonable charge for the electric power used by the cells. As the company has an annual load factor of 50 per cent. the possibilities are tremendous, providing there is a market for the gases. There is idle potentiality for the manufacture of one billion cubic feet of oxygen and two billion cubic feet of hydrogen annually. This is more than the annual use of oxygen in the U. S. and Canada, and many times the annual use of hydrogen.

Transportation costs limit the radius of economic supply from a central plant .and this disadvantage increases as the price of the gas at the point of use decreases, so that both gases would have to be used at or near the point of manufacture. This company contemplates using the gases in manufacturing processes, which also have been developed by its research department, and information regarding which will be given out from time to time.

> **I think we have had an over-abundance of engineering knowledge and a lack of good commercial sense.—W. L. Goodwin.**

Report of the Committee on Accident Prevention

During the war, although companies well realized the great need for the conservation of human life, due to the depletion of men for service overseas, yet they felt in some instances where it could not be perfectly proven that certain arrangements would materially assist in the saving of life, that the money and labor were not available for the carrying out of these otherwise laudable schemes. With the signing of the armistice, and, as we hope, the signing of peace within a few days, conditions have materially changed, and this Association might well look forward to carrying into very active operation some of the schemes that have been found to have merit in the prevention of the loss of life or limb to the employees of the electric companies. Some of the more important points that have been taken up by your committee might be classified under the following sub-titles:

Insulated Handles

Your committee wishes to draw to the attention of the association the extreme hazard in allowing men to use tools with insulated handles that are purchased from various manufacturers. This insulation is oftentimes depended upon for the protection of life where it is more a case of good luck than good management that a fatality does not result. Your committee would recommend to the association that, so far as possible, tools with insulated handles be not used except for very high voltages where special tools are required, but that dependence be placed upon rubber gloves tested according to specifications that will appear hereafter.

Classification of Reports of Acidents

For the past few years the National Electric Light Association has requested their members to report accidents on a form prepared by the association to headquarters. These reports are then compiled and statistical information prepared therefrom. This information is of inestimable value to member companies in seeing where most of the accident loss has occurred in the past, and so be prepared for the preventing of similar loss in the future. Your committee would recommend that similar forms be prepared by the Canadian Electrical Association and company members be requested to report accidents to the Canadian headquarters, the statistical information from which could be prepared and submitted to your association. At the same time the information being prepared in a similar way to that used by the N. E. L. A. would be conveyed to the N. E. L. A. to assist them in presenting more complete data. Copy of report of N. E. L. A. attached and marked "Appendix 1."

Rubber Glove Specification

For some years past the committee of the N. E. L. A. has been working on the question of the preparation of a specification for "the purchase, testing and care of rubber gloves for service on high voltage apparatus on circuits not exceeding 3,000 volts to the ground." Your committee has collaborated with the N. E. L. A. committee, and submits herewith, marked "Appendix 2," such a specification. Your committee would recommend that these specifications be adopted by this association and used by the Canadian member companies.

Specifications for Linemen's Belts

Similarly with the case of linemen's belts, we have collaborated with the N. E. L. A. committee, and a tentative specification has been prepared, copy of which is attached, together with blue print, and marked "Appendix 3". Your committee would recommend that these specifications be

RESUSCITATION FRO

By the Prone F

RECO

National Electri

Note—This chart is an abbreviatio
from Electrical Shock issue
Light Association, Engineer
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Permission to Reprint

Follow These Instructions Even If Victim Appears Dead

I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY

Quickly **release victim** from current, being careful to **avoid receiving a shock.** Use any **dry non-conductor** (rubber gloves, clothing, rope, board) to move either the victim or the conductor. Beware of using metal or any moist material. If necessary, **shut off current.**

II. INSTANTLY ATTEND TO THE VICTIM'S BREATHING

1. As soon as the victim is clear of the conductor rapidly **feel** with your finger **in his mouth** and throat and remove any foreign body (tobacco, false teeth, etc.). If mouth is **tight shut, pay no more attention** to it until later. Do not stop to loosen the patient's clothing, but **immediately begin actual resuscitation. Every moment of delay is serious.** Proceed as follows:

(a) Lay the **patient on his belly,** one arm directly **extended** overhead, the other bent at elbow and with **face to one side,** resting on the hand or forearm, so that nose and mouth are free for breathing (see Fig. 1).

(b) **Kneel straddling the patient's hips** with knees just below the patient's hip bones or opening of pants pockets; place the **palms** of your hands **on the small of the back,** with fingers spread over the lower ribs, the **little finger** just **touching** the **lowest rib,** the thumb alongside of your fingers; tips of fingers just out of your sight, as in Fig. 1.

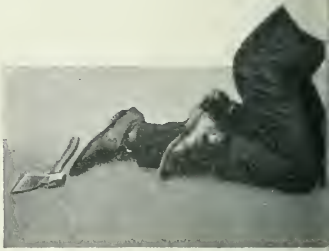
(c) While counting one, two, and with **arms held straight, swing forward** slowly so that the weight of your body is gradually, but **not violently** brought to bear upon the patient. (See Fig. 2.) This act should take from two to three seconds.

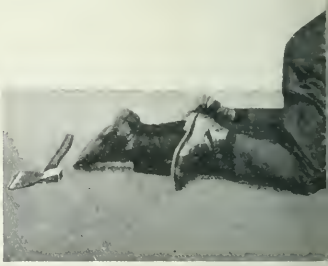
(d) While counting three, immediately **swing backward** so as to remove the pressure, thus returning to the position shown in Fig. 3.

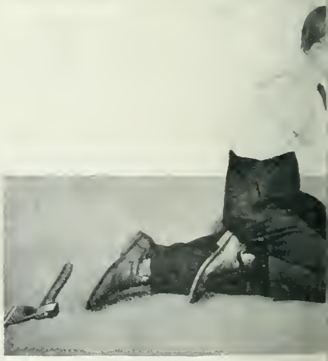
(e) While counting four, five—**rest.**

(f) **Repeat deliberately** twelve to fifteen times a minute the swinging forward and backward—a complete respiration in four or five seconds. **Time with your breathing.**

(g) As soon as this artificial respiration has been started, and while it is being continued, an **assistant** should **loosen** any **tight clothing** about the patient's neck, chest or waist. **Keep patient warm.**







Do not stop or interrupt resuscitation until patient

N.B.—This chart may be easily removed. Display in a conspicuous place.

ELECTRICAL SHOCK

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Fig. 1

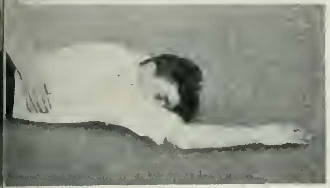


Fig. 2

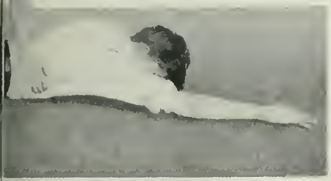
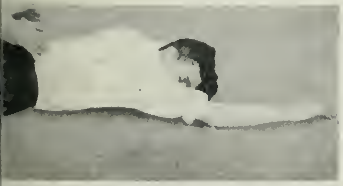


Fig. 3



2. **Continue resuscitation** (if necessary **four hours** or longer) **without interruption,** until natural breathing is restored, or until a physician declares rigor mortis (stiffening of the body) has set in. If natural breathing stops after being restored, use resuscitation again.

3. **Do not give any liquid by mouth until the patient is fully conscious.** Place **ammonia** near the nose, determining safe distance by first trying how near it may be held to your own. **Assistant** should **hit patient's shoe heels** about twenty (20) times with a stick or something similar and repeat this operation every five minutes until breathing commences.

4. **Give** the patient **fresh air,** but keep him warm. When patient revives **keep him lying down** and **do not raise him.** If doctor has not arrived, give patient one teaspoonful of aromatic spirits of ammonia in a small glass of water if he can swallow.

5. Carry on **resuscitation at closest possible point to the accident. Do not move patient** until he is breathing normally without assistance. If absolutely necessary to move, he should be placed on a hard surface, such as a door or floor of conveyance. **Do not stop or interrupt resuscitation for an instant.**

III. SEND FOR DOCTOR

If alone with victim, **do not neglect immediate and continued resuscitation** in order to call a doctor; start at once, the first few minutes are valuable. If other persons are present, send one of them for a doctor without a moment's delay.

An up-to-date list of doctors, with telephone numbers, is posted close to this chart.

The prone pressure method of artificial respiration described in rules (Section II) is equally applicable to resuscitation from electrical shock as well as cases of suspended respiration due to drowning, inhalation of gas, smoke or fumes or to other causes.

eathes or rigor mortis (stiffening of the body) sets in.

used by member companies as a tentative specification and criticisms and reports of attached be reported to your committee, so that more information can be obtained before a definite specification is adopted.

Co-operation for Safety Work

Your committee has had brought to its attention by one of its members, the very successful work of the Hamilton Electric Safety First Association, composed of the Hamilton Hydro-Electric, Dominion Power & Transmission Co., Bell Telephone Company, C.P.R. and G.N.W. Telegraph Companies, Hamilton Fire and Police Departments. By this association dangerous points on the various overhead lines in the City of Hamilton were brought to the attention of the officers of the proper companies, and where possible the difficulty was rectified. We attach hereto, marked "Appendix 4," a report by a member of this committee, together with other data, and would recommend to the association, where possible, the adoption of this scheme in other cities.

The bulletin of the N. E. L. A. has a section devoted to the work of accident prevention, and your committee would direct the attention of the member companies to this section of the bulletin. Data is presented there and short articles pertaining to accident prevention in the utility field, and it is hoped that such information will be read and put into practice where possible by your companies. This is practical information, written by those in utility work, for the information and guidance of men like situated.

Reunions and Sick Benefits

The National Electric Light Association at their Atlantic City convention saw fit to instruct their officers to appoint a committee to look into those most important employee relations pertaining to pensions, sick benefits and other welfare and economic lines for the benefit of the employees of the electric companies. In these times, when the newspapers and other press are full of problems of unrest, particularly that applied to relations between the employer and employed, it is not necessary for this committee to point out to you the seriousness of the situation, but we would respectfully recommend that the Canadian Electrical Association take ample means whereby their member companies, and particularly the executives of their member companies are kept fully advised as to the best methods for solving this most serious problem, and where your committee can most help it will be glad to do so if directed.

Educational Publicity Methods

In the report of the Accident Prevention Committee to the N. E. L. A., they made a very full and complete report in connection with education and publicity methods in connection with accident prevention. Your committee would direct the attention of the member companies to this report.

It is very complete and well warrants the reading, particularly of executives of companies.

Goggles

It has been found that some member companies do not know where to find the goggles for the protection of their men that they require. For general information, goggles for the protection of the eyes of workmen from electric flash can be obtained from A. H. Hardy & Co., 10 South Wabash Avenue, Chicago, Illinois. They are called the "Harco Safety Goggle," and if fitted with Noviol lenz, will protect the eyes of workmen from the ultra-violet in an electric flash. Your committee would also recommend that member companies see that their men are equipped with suitable goggles for the protection of the eyes from flying chips of steel or concrete when doing any chipping or drilling of these materials. These goggles can be obtained from a number of reliable goggle manufacturers, and if member companies are not able to obtain the suitable goggles, information will be supplied from your association headquarters.

Your committee has been giving particular attention to the question of resuscitation methods for electrical shock, and has kept in touch with the work being carried on in the United States. Without further comment we would recommend that this association formally approve "the rules for resuscitation from electrical shock by the prone pressure method," as isued by the N. E. L. A., in booklet and chart form, copy of which rules are attached and marked "Appendix 5." We would further recommend that this Association make arrangements to print the rules and the accompanying chart over the name of the Canadian Electrical Association for distribution where found desirable in Canada. For your information these rules have already been approved by the Hydro-Electric Power Commission of Ontario by the Association of Municipal Electric Utilities of Ontario.

Your committee feels that it has done very little during the year, but has attempted to present before you some of the more important points in connection with the work of accident prevention. These points may appear to deal with the more physical side of the work, but in previous reports your attention has been drawn to the fact that without sincere co-operation and active participation in the work of accident prevention, from the highest official of the company, down to the newest employee, successful accident prevention is impossible.

(Signed) Wills MacLachlan, Chairman,

Report on Overhead Lines

Mr. A. A. Dion made a verbal report on "Overhead Lines." Practically the only work his committee had undertaken was in gathering information on outdoor sub-stations in connection with which a questionnaire had been sent out. Regarding the use of bare versus insulated wires for 2200 volts and under, Mr. Dion quoted the following opinion of one the member companies:

"Re bare wire for line use under 2200 volts. It has never been the practice of this company to use bare wire for city distribution and although it is generally understood that the insulation on the wire, especially after it has been baked out, is no adequate protection for 2200 volts, it is useful in the erection of the lines so as to avoid mechanical injury and also from coming in contact with live lines already placed.

"Our company's rules provide that all lines are normally considered alive by our men and work done accordingly. Lines are only treated as dead when known to have been killed properly, and the proper clearances given. In order to show differentiation between primary and secondary lines, lines of 2000 and 4000 are erected in porcelain insulators, while low voltage lines are on glass insulators.

"Use of both bare and weatherproof wire would necessitate carrying two classes of wire in stock as well as on repair and construction wagons. In city work the primary is only a small part of the distribution system and it would be still necessary to supply insulated weatherproof wire for all service work.

"In outlying districts where primary runs are long and service connections few it would likely be considerably more feasible to use the bare wire."

Mr. Dion gave it as his own opinion that while ordinary weatherproof triple-braided insulation is not altogether effective and linemen should treat all wires as alive, still the insulation is some measure of protection in dry weather and he favored its use on city streets.

The Contractor-Dealer

W. L. Goodwin Discusses Every Phase of Electrical Merchandising. The Apostle of Co-operation at His Very Best at Niagara Falls Convention. Evidence that His Seed, Sown with Such Care and Skill During the Past Two Years, is Bearing Fruit. The Address and Discussion Practically in Full

Perhaps one reason we have been deficient (and this applies particularly to the representatives of central stations, whether they be publicly or privately owned—the principle is the same in both cases) is that we assume the attitude of an ordinary merchant and imagine we have a product that the public will rush out and purchase simply because it is offered at a low price. That is not so. The technical nature of the product we sell, whether it be energy or merchandise, the newness of the product and the almost total ignorance thereof on the part of the purchasing public, should convince us with a little thought and study that no cheap, price-cutting methods will accomplish the ends we are striving to obtain. We must sell our product. If one were to make a trip throughout Canada he would perhaps find 75 to 80 per cent. of its homes unwired, and that percentage would carry even in some of our larger communities, proving conclusively that we have not sold the electrical idea to the general public. There can be no question, particularly in the province of Ontario, that you have offered the product at a low enough price! You have offered it almost without profit, and in some cases, I dare say, without profit, and still you have not persuaded anywhere near 100 per cent. of the people to use the product you are endeavoring to sell.

Intensive Methods for the Industry

An analysis of your rates would probably prove that much of your consumer business is taken at an absolute loss, and still the consumers have not flocked to your offices and demanded this product of energy or appliances at the low price at which they are offered. It is proved that right throughout this continent the product we have to sell must be sold by intensive methods. Aside from the fact that we have something to sell and that it should be sold at a profit, whether publicly or privately owned (as I will attempt to prove to you later on), something of a technical nature of which the public are largely ignorant, we must agree that to sell anything requires intensive methods. Then why not employ those intensive methods in our electrical industry? In other words, we must organize ourselves to present our commodity to the public in an understandable way, so that they will benefit by what we have to offer. Apart from the fact that we have something to sell, there is a greater responsibility upon the electrical industry than upon any other single industry. I contend that our industry offers a greater opportunity for the development of a country and of all humanity than that offered by any other industry. In other words, if Canada was thoroughly saturated electrically there would come opportunity for the development of your country.

Convenience of Electricity Induces Spread of Population

Our industry will perhaps do more to break down the great centers of population and spread it evenly over a greater area than any other dozen industries combined. In the United States (and it must be so in Canada—or will be so in time) we are facing a serious situation due to the building up of these great centers of population. The attractions they offer to the public make life on the farm desirable, and today you can find throughout the United States, and I dare say throughout Canada, papers literally filled with advertisements for farm help and no response! In the evolution of things we can go back and by an analysis of our past experiences we can anticipate the conditions which will exist a decade hence unless something is done to spread the population of the country more evenly over the land. People flock to the centers of population because of the easy conditions of living, because of the facilities for obtaining employment, and many other inducements that are offered in the great cities. The electrical industry is the only industry which is in a position to offset those inducements and to place the farmer in the position where he can enjoy everything enjoyed by the city dweller. By reason of the centralization of power in the large cities factories congregate there, which has made the situation much worse, and with the exception of electrical energy the transmission of power over large areas would be almost impossible, because of the prohibitive cost of so doing. In our industry we can deliver power where it can best be used, and in addition to delivering power, all the other conveniences that accompany it. There is no longer a necessity of

Mr. W. L. Goodwin, the apostle of co-operation in the Electrical Industry.

locating factories in great centers of population because of the expense of power. Power can now be supplied throughout the land just as cheaply as it can in the large centers, to a reasonable degree. Therefore the electrical industry is going to be the means of changing the whole situation throughout the land, and nothing can make the "back to the land" movement more attractive. We must spread the people back over the land, because after all, the production in the industrial centers is not the kind of production that makes for prosperity. The farmer is the only real producer, and when we cut off the farmer everything must cease.

Fallacy of the "Bargain Sale" Method

We are passing through an era in the United States and Canada today in which it is no longer possible to induce men to farm. There is too much labor required for the compensation given. The electrical industry, however, is in a position to change the whole situation. But going out to the farmer and offering him electrical energy at one cent a kilowatt means nothing to him. He does not understand relative values. He cannot conceive of kilowatts at one cent paralleling wheat at $2 per bushel. He is not interested in kilowatts per bushel, but is only interested in making a profit on the product he purchases; and the fact that foreigners are not utilizing the products we have to sell proves conclusively we have not employed the right method in selling our product. We have adopted the "bargain sale method" and have reflected that idea from the department stores, never realizing that the bargain sale method only represents about five per cent. of the sales of the department stores, and very often represents from 1 per cent. to 2 per cent. profit. On the train last night Mr. Chase mentioned that he fell for one of those bargain sales, only to find that the bargain sale price was enhanced by about 25 per cent. over the regular price for the rest of the month.

Lack of Commercial Sense

A little knowledge is a dangerous knowledge, and we have had too little knowledge in the electrical industry. From the standpoint of the central station I think we have had an over-abundance of engineering knowledge and a lack of good commercial sense. As an example I might cite a man who goes to a good college and acquires an engineering knowledge and comes out of the college and goes into the central station or into the commercial field. If he goes into the commercial field he will invariably drift into one form or another of the lighting industry. Why? Because there is something scientific or technical about it. He immediately starts to sell light on a scientific basis! Now, imagine talking to the average housewife about illumination on a scientific basis. She knows and cares nothing about it. Illumination is not the thing we want to sell to the housewife. We want to sell something which will make the housewife's work easier. We want to sell labor-saving appliances and devices, particularly in view of the scarcity of servants in these days, and in view of the very reasonable doubt that in the future the servant will be with us any more. My wife wants something to save labor. She understands lighting. You cannot sell my wife, nor any other man's wife, by saying to her: "Here is a flat iron at $2.75," or "Here are kilowatts at 1½ cents." She wants somebody to go up and explain the virtues of those particular appliances, and not only does she want to know the virtues of those appliances and how they are going to affect her daily work, but she particularly wants to know what kind of an instalment basis she can purchase them upon.

Sell What Product Will Do

The product we have to sell cannot be sold for cash in any great quantities, as is proved in the sale of the washing machine and vacuum cleaner and other labor-saving devices. That has been proved in over 90 per cent. of cases in the United States. In the case of the washing machine we have had an increase in price of from $75 to $150, and still there has been a tremendous increase in the purchase of that commodity on the part of the consumer, because we have learned to employ intensive selling methods. We are not talking price to the consumer; we are telling what the product will do, rather than what it costs, and after all, prices are relative. The public soon get to know that the Ford automobile is worth so much money, and Ford is selling as many automobiles today as he was three years ago, in spite of the increase in price; the price of the Ford is compared with the price of some other car. We proved that conclusively in California, where we had a per capita consumption of $5. In those days we employed every conceivable cut price and vindictive business method in order to put our product over on the people, and we were able to get away with an annual per capita on appliances of about $5. Finally somebody conceived the idea that that was not the way to sell our product, and that we should get together, organize and advertise and put up a sufficient margin of profit to those interested to justify the selling expense. We tried that scheme for about three years and the per capita consumption rose to $30. By proper advertising, display and solicitation we convinced the public that we had something they wanted. You have to employ about the same methods in Canada. You have assumed that the way to put over the electrical idea was to offer your products at a low price. That is particularly true in the case of your merchandise, and also applies to the sale of energy. What does it amount to? The energy consumed in an ordinary home, using all the appliances they may, amounts to $3, $4, or $5 a month. What difference does it make whether it is $2 or $5? You do not stop to figure your pleasure in an automobile by the number of gallons of gasoline consumed. In other words, the automobile has been sold with the idea that it is something people want, and they will make sacrifices in order to purchase an automobile.

A Fair Price for Product

With the proper effort we can sell the same idea to the public electrically. We can convince them that the thing we have to sell is worth so much money. Do not let us talk in technical terms of kilowatts. It is all right to talk about cost of production when you approach a man in a factory for the purpose of selling him power in large quantities. In his case you can reasonably expect that he will comprehend your meaning, but not so in the case of the consumer. We must employ the most modern, intensive methods of selling our products, and we have not done that. I dare say that 3, 4, 5 or 10 times the amount of energy can be sold in Canada. What is the use of taking the public into the secrets of the electrical industry as to the relative merits of public or private ownership? And, after all, who cares? The publicly or privately owned plant can do the job, and do it right for the public. In one community it may be public ownership and in another community it may be private ownership, but both private and public ownership will prosper depending upon the attitude of the public, and the attitude of the public is not going to be favorable simply because we offer the product at a low price. If we get a fair price for our product we can afford to employ the very best means of marketing it.

Plants, Public or Private, must be Self-Sustaining

Let us take the publicly owned central station. Bonds must be sold. The public will purchase the bonds so long as they have confidence in the property, and their confidence in the property will be measured by the ability of the men financially and in every other way. We can fool the people over a short period of time by eliminating from our accounting methods proper charges for depreciation and a lot of other things, and at the end of 15 years we can scrap the plant and go out for a new bond issue and get a lot of money to start over again. That, however, is a temporary proposition, and after a time the people are going to give it up, and the financing of public ownership property on any such basis must sooner or later result in disaster. Every recognized sound method of accounting employed either in private or public ownership should be applied. You should set up your proper reserves and operate your property at a profit. If you do that you have ample funds to take care of this tremendous field of exploitation. You cannot keep running to the public simply because you are a publicly-owned property and ask them to buy bonds to provide funds to exploit the industry in undeveloped fields. It seems to me that reserves should be set up to take care of exploitation. You cannot afford to operate a utility with a tax on the entire public when only a part of that public participate in the thing you have to offer. It is unfair to operate a street railway at a loss (assuming it is a publicly-owned street railway) and absorb the loss in a form of taxation covering a lot of people that do not use the street railway. It is unfair to operate a lighting company at a loss and call upon the public generally to sustain that loss when only 25 or 50 per cent. of the population utilizes the electrical energy. Those who utilize a product should pay for it, and therefore every operating company, whether privately or publicly owned must be self-sustaining. It is just as much to the interest of the publicly-owned plant to see that the privately-owned plant is self-sustaining and a proper rate allowed. The point I am trying to make is this, that after all there is no difference internally in the trade between the position of the operator of a privately-owned plant and the position of the operator of a publicly-owned plant. Their problem is the same—to serve the people. If the people desire to take over the plant we in the electrical industry, who know values, should be willing to set up a fair price and take the property over and operate it if that is what the people want. If they do not want it we need not concern ourselves.

Electrical Industry Used as Political Weapon

I think there has been too much mud throwing in the electrical industry, particularly by politicians who use the electrical industry and public ownership as a means of carrying an election day, and I do not think we men in the electrical industry should permit our business to be used for such purposes. We have a greater service to render mankind than simply to make grandstand play out of our electrical industry and use it as a political weapon.

We should be fair to one another. That applies in the central-station branch of the industry, and applies between the manufacturer, the jobber and the contractor-dealer. The greater the number of contractor-dealers you have operating in your community and conducting well-kept, high class, retail electrical shops, the greater number of appliances will be used by the public and the greater amount of electrical energy will be used, and the greater service will be rendered to the public, and that is, therefore, your responsibility as public servants to give the public the thing they want. What they need today is an easier means of buying electrical appliances and a more thorough knowledge of the thing we have to sell. We have not enough high class retail establishments—whether they be operated by the central station, the jobber, the contractor-dealer or the manufacturer is immaterial, the more the merrier—but we must make it easier for people to buy electrical appliances. We must properly display our product and not talk in technical terms of watts consumed and load per kilowatt, because that is not what the people are interested in. The labor of a days' washing under the old method as contrasted with the new method is no basis of comparison in cost of energy consumed, and it does not matter if your rate is 1c, 2c or 3c. The same remarks apply to cooking. If we sell the electrical appliance on the basis of convenience in cooking we ought to be able to get more money for the thing. We are a poor lot of business men if we go out to sell an electrical cooking appliance, with all its convenience and cleanliness, and find it necessary to undersell the coal man! There is something wrong! We should try to find out what the cost is in the case of coal, wood, and other means of obtaining heat, and we should get as close to that cost as we can, but we must not try to undersell our product.

Present Problem is a Commercial One

The antagonism between groups (and it has prevailed in Canada) has been due largely to ignorance of our problem. The fact that we have struggled primarily with engineering problems is responsible. Our industry has been in charge of engineers. We have had to undertake this great water-power development and the solution of all these engineering problems, and the commercial end of our business was of little consequence. That is financially proven by the condition of many of the public utilities. They show that we have not had sufficient commercial talent behind the enterprise. Now we are calling for a higher degree of intelligence from the commercial side of the business. We are calling for a new type of men in the electrical industry, a real commercial man that can go out and properly present our product to the public. If you analyze the articles which appear in the press (and have been in our technical papers) you will find a strain of commercialism hitherto absent. You will find that the largest percentage of space in the ordinary trade press is devoted to commercial problems. We have solved the engineering problems. We can go down to the Falls and take away 20,000 or 50,000 horsepower, as may be required, without difficulty. Our engineers understand how to do that, but the problem is to sell the product after it is produced. We need not worry about the engineering problem any more, the engineer has solved his problem, and the great problem of the future, in the electrical industry, is a commercial one. Bear in mind that in Canada, as well as in the United States, you have not reached five per cent. of your potential market. You have still 95 per cent. of the road to cover. Is it the road of engineering? No, it is the road of commercialism. It is a road of popularization, of intensive selling. We cannot hope to travel that road by bargain sales or while friction between the various groups exists and unethical policies on the part of the manufacturer, the central station, the jobber and the contractor-dealer persist. An answer to your problem cannot be found by the utility man, the manufacturer, the central station, the jobber or the contractor-dealer alone, because of the interlacing of the electrical industry. You cannot come down here and start the wheels and turn out kilowatts and have them used. Somebody must manufacture wires and appliances, and somebody must build the houses to put them in.

Make Electrical Industry an Ethical Business

Go into a restaurant and see if you can find a waiter serving the beginning of the meal and another waiter coming along when it is about time to hand out the tip! Each man knows his place and keeps it. In the medical profession, if you are a doctor's client and right in the middle of your case you decide to discharge that doctor and employ another one you will find great difficulty in getting another doctor to take your case. Just try it once and see what will happen. He will want a thousand and one reasons why you should desire to change, and before he will accept your case he will go over and talk the matter out with his brother doctor whom you have discharged. Conceive of such ethics in the electrical profession, an electrical contractor having a client and serving him well and faithfully and another electrical contractor saying "I will have to talk this over with Bill Smith before I take this job." Can you conceive of the condition where there are two central stations in a community either privately or publicly owned—in some cases in the United States we have two privately-owned companies and sometimes one privately and one publicly-owned company and in another case two publicly owned companies. The central station man's idea of success is to employ every means he can to steal a customer away from the other fellow, very often knowing he is not going to give as good service as the customer is then receiving. Why, all of our engineering talent and college training is wasted when we get into business. What do we gain by it? We are not told and not paid to do it in that way, and we know as men that we should not do it in that way. Why do we do it? We are not working on a commission basis. We are not compelled to go out and perform the acts of a thief.

Getting at the Causes of Friction

I assume this group before me are real business men. Supposing I ask you what you are doing as business men to bridge the friction between capital and labor, what would you reply? What are you actually doing? Are you going out and meeting these people and talking to them and trying to understand their language and their problems? And if you understand them and there is any merit to their case, are you willing to sit down and talk these things over and try to find a solution, or are you going to be fool enough to set yourselves up and, exercising the power that Germany thought she could exercise, try to put the laboring man in this country down? Is that our job? There is something labor wants, and anyone in close touch with labor knows what it is. It is not money. Anyone who believes labor is organized simply to get higher wages is absolutely wrong, and has not sensed the pulse of the working people. The working people want a new relationship and a new kind of treatment on the part of the employer. They want to sit down and talk about things which interest them. They are not concerned in the profit of the factory—that is to say, how much profit the factory makes above a reasonable profit—but what they want to know is that they are going to have permanent employment and be treated like human beings with red blood in their bodies and families in their homes, and to receive a wage sufficiently high to meet the cost of living and permit of provision for a rainy day. Are you going to ignore these things? That is what has been done in the electrical industry, and it is the job of somebody to go over the country and bring out these facts that produce friction in industry, either between employer and employee or between group and group, or between business and government, and to get at the fundamentals which are causing the trouble and ascertain the solution thereof.

Let me outline the Goodwin Plan and enumerate the planks thereof.

The Goodwin Plan

A campaign of education conducted principally through trade papers, trade organizations and other channels, to co-ordinate the various interests in the electrical industry and to bring them together in harmonious action, so that there may be established retail distribution of electrical materials at fair prices to the consumer, and at a fair profit to all parties taking part in the transaction.

The basis of the plan is:

1. That each individual owes a responsibility to the organization representing his branch of the industry.

2. That the organization owes a similar responsibility to its members.

3. That each organization representing each branch of the industry owes a responsibility to all other organizations in the industry, all to the end that all problems may be discussed, having in view the interest of all, thereby providing a basic plan for more adequately and efficiently serving the American public, resulting in an extension of the activities of our industry to the great undeveloped field before us.

Objects of Plan

Intensify development in present fields. Extend the industry to undeveloped fields. Develop greater efficiency in industry.

Procedure

1. Bring together the various interests in the larger cities, cause them to formulate a plan to extend the work to the smaller towns and cities of each state.

2. To accomplish this, committees should be appointed from each of the four divisions of the industry forming local committees charged with the duty of making a study of local problems and co-operating in their solution.

3. Individuals comprising these committees will report their activities to their national associations, causing their national associations to take similar national action, looking to the solution of national problems.

Results

To produce harmony and develop co-operation between manufacturers, central stations, jobbers and contractor-dealers.

To produce greater efficiency in the distribution of manufactured products.

To increase per capita consumption of electricity, apparatus, devices and supplies.

Establishment of high-class stores.

Decrease in costs of conducting overlapping trade associations, and saving of personal time incident thereto.

Create a more favorable public opinion.

The planks of the Goodwin Plan are as follows:

> 1.—A strong representative association of electrical contractor-dealers (retailers) and urges all interests to lend immediate assistance to this end.

What are the fundamental things we must do? We must organize. You have your Association of Municipal Electrical Engineers. Develop it and make it a better and stronger organization, and invite the groups in at all times to hear your discussions.

Helping the New Organizations

There has just been formed Associations of Manufacturers and Jobbers in Canada. Let us all put our shoulders to the wheel and help those organizations along. They are new-born babes and are going to meet with all the troubles that infants meet with. The baby is going to stumble and skin its nose and get into backyards where it doesn't belong and do a lot of other fool things all new-born babes will do, all because they must get experience. You cannot tell this child anything about the experience of the father. He just wants to look over the precipice and fall down once or twice to see how it feels. So to keep this new-born babe out of trouble let us all help.

Similarly with the contractors, who have recently organized. Let us help them, too. These three organizations need development, and if the men who are operating public utilities throughout Ontario or Canada will not put their shoulders to the wheel, who will? Of course, I know you are doing everything you can, but for fear that there may be one man in the group who cannot see the justice or advisability of doing something to help these other organizations along, I say these words.

There is a real responsibility delegated to you as technical men and commercial men to develop this industry, and here are three new-born babes that need your help. Let us see how we are going to help them. We must build them up and tie them together. You should have in every community in Canada a good strong electrical association, with everybody in the industry meeting together and talking over local problems, and then tying these local organizations up to one Dominion-wide organization where you can get together at some other period and talk Dominion-wide problems.

> 2.—Each division of the industry should prepare a code of ethics outlining its own functions, relations and responsibilities to each of the other divisions of the industry.

It is a very simple matter to prepare a code of ethics. The central station man should be able to come right out and say "Here is what we do," and spread it broadcast so that the men in the trade will know.

> 3.—Each division of the industry should establish a code of practice, outlining its methods, policies, etc., in dealing with other than divisions within the industry.

Too Much "Junk" on Utility Bills

Can you conceive of anyone in the central station coming out with a little pamphlet stating the electrical idea in simple, understandable language, so that Mrs. Housewife can appreciate it? We seem to surround the whole electrical idea with mystery. My wife received a set of bills for gas, electricity and water, and it would take the best accountant in this room to figure them out. There is too much junk put on the average utility bill. You have to sit up all night to understand the thing. All the housewife is interested in is "$2.40"; that is all she wants to know. So many kilowatts at the last reading and the next reading is of no interest to the housewife. Send her the bill for $2.40 and don't talk about a lot of kilowatts. If you have any space on the bill put "Have you an electric iron?"

Can you conceive of a condition where the central station would put a simple little tag on its meter or in the house and tell the public "When you buy a lamp for this house buy it at 115 volts" or "110 volts," and tell them why. Have we ever attempted to explain to them the analogy between water and electricity? A woman knows if she turns on the water tap so much she gets so much water, and if she turns it on a little more she gets a little more water. Down at Hot Springs a little while ago Mrs. Goodwin asked me to purchase a travelling iron, and I bought a 110 volt travelling iron in a nice case and gave it to her and told her to connect it to the socket, and went out to play golf. I came back three hours later and found her in a nervous fit, and said "What is the matter?" and she said "This says 220 volts and you told me never to put 220 volts on a 110 volt circuit."

"A Lot of Damned Jackasses"

A woman cannot get that stuff at all. Then, of course if she tried to connect it in any ordinary place she just would not get it connected at all. There are just as many kinds of baseboard receptacles as there are electrical men in this room. Mrs. Brown buys an electric flat iron and takes it home and it fits right into the plug she has in the house. Next week she buys something else and goes to plug it in and she jabs and jabs and shoves, and what she says and thinks about electrical men!!! Talk about a lot of brainy electrical men! We are a lot of damned jackasses. Here are a lot of college men and technical main trained in an industry, and yet they go out and sell 150 different kinds of receptacles to a lot of women and children and wonder why we have not popularized the use of electrical appliances. It is all very fine for the engineer. His wife says "I cannot connect it," and he says "That is all right, that is a G.E. plug," and goes and gets another plug and fixes it up, but his wife sits there and looks on and thinks. We must start a campaign all over the land and rip all these plugs and receptacles out of every home and put in standard plugs, just as we took out the T.H. and Westinghouse and all the other sockets and picked out one that was standard, with the result that now you can screw in a lamp anywhere. Soon we are going to scrap all these voltages and have one voltage, and some day when the engineers get together they will scrap these thousands of different frequencies.

> 4.—Improvement in merchandising methods, better display, and the encouragement of more retailers, by urging present contractors to open retail stores, thereby enlisting the support of central stations and offering a broader and larger outlet for manufacturers.

That really needs no explanation. A visit to electrical shops all over the world will convince anyone of the unsuitability of the methods that have been employed. We put in a fine display of material and then sit there and wonder why people do not come in and buy it! How do you expect them to buy it after what I have mentioned to you? The product must be well displayed and clearly marked. I went into the Washington Power Company's place at Spokane on Decoration Day, where I saw fine show cases and lots of product in them. I said to the manager: "I happen to know that is an electric egg boiler, but my wife would make 2,000 guesses and never guess what it was. Why don't you put a little sign on it and let her and other housewives into the secret?" In a window in Baltimore I found another example of the same sort of thing. A contractor down there opened a fine retail store. He remarked that it was not making the progress expected. I said "How long have you been open?" A.—"A month." Q.—"What are your sales running?" A.—"$28 a day." Q.—"What are you doing to get people in?" A.—"I have a fine window display." Q.—"Are you not doing anything else?" A.—"No." He assumed that because he put in a fine window display and opened the door the public were going to make a mad rush into the store and buy his product. The window display was fine. The fans in the window were all moving, and so had an interest value, but no pulling value. There was nothing about price, nothing about the fact that now is the time to take the fan while the weather is hot. There is all the difference in the world between interest and attention and pulling value to a window, and so it is with selling what you are advertising You can run a whole page of advertising ,and if you don't know how to write your ad. you won't get any replies. You won't pull. Advertising is a business. Very few contractors can write ads. We need a higher degree of intelligence in our advertising. Our merchandising methods have been bad and unmodern. If a man is going to run an electric shop he may be ever so efficient an electrical engineer or contractor, but he should go out and hire a man who understands merchandising. I would prefer that such a man did not know anything about kilowatts or voltages. He could be taught all he needs to know in a very short time; but you could not transform an engineer into a merchant in five years. It is a profession in itself. You know all about machines, and can tell when they are overloaded, and so on, but that does not make you a merchant. If you have not a merchandising man now, train one in your organization; send him to school and have him find out something about it.

> 5.—Recognition of the service functions of the contractor-dealer and recommends a differential when this service is performed.

That, of course, lies at the door of the manufacturer. We talk in terms of discount. Again I want to say that a little knowledge is dangerous knowledge. There are very few engineers who know anything about discount, just as there are very few commercial men who know very much about engineering. I only spent four years studying engineering, and I admit I do not know anything about it. It does not appeal to me at all. I will accept the superior knowledge of the engineer on an engineering problem, but I demand that he submit to my superior knowledge on the commercial side because I have over twenty-five years on the commercial end, and I can talk to him about the commercial end of the industry. Engineers talk about discounts. A discount is one thing; compensation for services rendered is something else. There is no basis you can set up (and I will debate this point with any man in the country) whereby a central station under any condition should get jobbing compensation. They do not render jobbing service, and should not get it. Discounts should be given to anyone or everyone in or out of the trade, and they should be based solely on the cost of handling the product. In other words, a socket is worth so much on the manufacturer's shelf and worth so much in a case or carload. What can it matter to the manufacturer as to who buys the commodity so long as he gets the same price? That is a discount. Now we get into the trade. We have jobbers and contractor-dealers and central stations selling merchandise, rendering a service to the industry—selling advertising, displaying, warehousing, financing, accounting, taking care of depreciation and everything that comes with the passing of the product from the manufacturer to the consumer. Jobbers, contractor-dealers and central station rendering that service are performing a part of the industry's service and should receive compensation therefor. It is altogether different from a discount. It is just as different from a discount as kilowatts are from volts. You would not have to sit up all night to tell the technical man the difference between a volt and a watt or a volt and an ampere, but the technical man does not understand the commercial side of it, the difference between discount and compensation. We must have houses wired. We must have retail stores, and compensation for services rendered. Do not confuse the two propositions, and try to tear down, by getting some price that the dealer or jobber or central station is getting in the distribution of merchandise in the form of services rendered, by going to the manufacturer and telling him you want the discount the other fellow gets; that you want compensation for services you do not render. You are powerful enough to do it and you might force the manufacturer temporarily to give it, but it is not right and is not ethical. The jobber should get compensation when he renders a jobbing service, because that is a part of the internal problem of distribution. There is just as wide a difference between compensation and discount as there is between a volt and an ampere.

> 6. The sale of high-grade electrical material; the establishment of high-class specialty retai lshops; improved specifications in wiring installations; and the introduction of liberal use of convenience receptacles.

The tendency of the electrical people has been to cheapen the product. You are faced with that situation right throughout Canada today. You have an influx of Japanese-made material the quality of which is disgraceful. If they want to come in and compete let them live up to a high standard. We all know the quality we are selling is bad enough, even the best we can get, with all the complications of voltages and frequencies and everything else. The public have become generally suspicious of what we are selling today. Let us not make worse the quality of the product; let us better it. Any contractor-dealer, jobber or central station that encourages manufacturers, and particularly foreign manufacturers, to come into this land, and will swallow the low price product, is a menace to the community.

> 7.—Broader education of the public concerning the problem of the electrical industry, and concerning electricity, its use and the application of household devices.

> 8.—Retailers applying intensive sales methods in connection with small devices used in home, factory, office, etc. (such as washing machines, vacuum cleaners, dishwashers, electric ranges, electric heaters, household heating devices, sewing machine motors, fans, lamps, portables, fixtures, vibrators, hair dryers, ice machines, etc.).

Let us take the public into our confidence and tell them the simple story of the electrical industry. The Sunday morning papers are just filled with stories about fine touring trips, and how to change an automobile tire and put on a patch. We are being fed that stuff, and we love it, we just eat it up! But think of taking up a paper and reading all these things about the electrical industry! Why, that would let the public in on our secrets! The automobile fellow is telling Mrs. Goodwin how to fix a spark-plug, how to change a tire, and two thousand and one hundred remedies for preventing punctures—just a lot of idle talk which gets people interested in the automobile. Right now the average woman knows more about an automobile than most of us do.

We should have public lectures illustrated by lantern slides and moving pictures. Once a month a man should be delegated to lecture to the public in every community in the country. People will flock to these lectures and will subsequently flock to the industry and have their houses wired and purchase appliances, because they will understand what they are about. We must tell them; it is our job to educate them. We get the trade papers and advertise to each other—just go around in circles all the time. We have a lot of manufacturers downstairs telling the fellows in the trade what fine things they have, and that is a good idea; but the real idea is to go out and tell the public about it. We want to advertise in the trade to keep the trade alive to what is going on. We want more public exhibits, and when we have these exhibits we don't want some fellow with a great big static machine taking 200,000 volts through him and scaring the people to death. That is the kind of stuff we put in the electrical shows. We do not want to deceive the public at all—there is enough deception to the business without deliberately practising it!

> 9.—The introduction and application of proper cost-accounting methods in wholesale and retail merchandising, particularly if either function is a minor department of a company.

That is clearly understood. The idea of that is to make each department of a business self-sustaining. Departmentalize your business. Put in proper cost-accounting methods and make each department carry itself. After you effect that you will have real economy. Some of the central stations take great pride in that! Again, a little knowledge is dangerous knowledge. If it is good accounting to divide your business into departments. and get the cost of departments, why not divide the departments into commodities and get the cost of commodities? Don't tax the selling of rubber-covered wire on to the washing machines.

> 10.—Free and unobstructed flow of trade along most economic channels, without attempt to direct it through fixed channels.

That comes, of course, through the medium of the closed association, where jobbers and contractors ,and sometimes even central station men combine for the purpose of forcing manufacturers to submit to uneconomic policies. It is not sound, and will not last. Trade must take its natural flow. I am sorry Mr. Chase did not read a paper he showed me while we were coming up on the train, entitled "The Channels of Distribution in the Electrical Industry." After you have heard it you will be convinced that the industry is travelling at the present time in unmarked channels. We fail to mark the channel with proper beacons, and trade differentials and compensation, but we force it through arbitrary channels and make it just as difficult as we can to get our product from the producer to the consumer.

> 11.—That central stations conduct retail departments for the sale of lamps, appliances, devices, portables, etc. ,and operate same in accordance with the ethics of retailing and with full regard to proper cost accounting.

> 12.—That all interests conduct retail depart-

ments to be operated at a profit. The adoption of this policy on the part of central stations and jobbers will result in a large number of concerns entering the retail field.

That brings us back to proper cost-accounting. It means that the fact that you are in the central station or in the retail business is no reason why you should operate that business at a loss, and tax it on to somebody else's kilowatt.

13.—Recognition of the service function of jobbers in the distribution of supplies and recommends a differential when full service is performed, and a proportionate differential is performed, and a proportionate differential when only a partial service is rendered.

I have already explained the difference between compensation for services rendered in the trade and discount, and we are commencing to grasp that.

14.—Jobbers determining, through proper cost accounting, the cost of warehousing, and selling their principal commodities, to the end that each principal commodity will carry its proper portion of overhead.

I have just told you where the jobbers have appropriated money to determine these costs.

15.—Open meetings of all trade associations, including meetings of executive committees.

I am very happy to say that principle has been adopted practically all over the country, and we have made wonderful progress through the result of this open meeting idea.

16.—That the electrical press become an integral part of each division by honorary or associate membership, and that unrestricted publicity be given the proceedings of all meetings.

That has taken place. Publicity is what you want. Leave it to the good judgment of an editor of a technical paper to publish what will help the industry.

17.—The formation of a national lecture bureau, with state and local staffs. The function of the staff would be to carry on educational work within the industry and before public gatherings. Service to be gratuitous.

18.—Recognition of the principle that any action be taken by a single division which affects another division is seldom satisfactory unless each division affected is represented.

That is simple. If the central station, the manufacturer, jobber or contractor-dealer are about to take action which affects another group, representatives of that group should be called in, because in these days you cannot, simply because you have the power, decide what is good for the other fellow, and force him to submit to it. He will not do it. If you are going to take action that affects another group, call in the representative of that group and talk things over.

19.—The appointment of committees by the National Electric Light Association, Electrical Supply Jobbers' Association, Association of Electrical Contractors and Dealers ,and various manufacturers' associations to meet together to study the problems of the industry and to co-operate in finding their solution.

20.—Consolidating or reconstructing overlapping organizations. A committee comprising representatives from each association should be formed to study this question and submit a plan.

21.—Eventually a single organization in the electrical industry, consisting of national, division, state and local sections; also main national sections for the solution only of functional problems of the several branches or groups.

I expressed to your president my hope that before long these problems will be indexed and catalogued and studied and answered. When that has been done co-operation will be effective and our organizations will be developed in every community, province and state, until there is a single organization in the States and a single organization in Canada, and eventually a single international organization with proper sections and groups to represent every section of the country. Then we will get the best ideas together and the industry will progress.

Mr. Goodwin concluded by referring to his Wheatstone bridge chart and explaining the parallels between the operation of this instrument and relationship of the various elements in the electrical industry.

DISCUSSION

Mr. Perry: Mr. Goodwin said that on the Pacific Coast the amount of electrical energy sold per capita per annum had been increased from $5 to $30. That, with an average of five people per family would amount to $150 per family per annum, or $12.50 per month. That is so much in excess of the average domestic monthly bill of the Hydro System that I am interested in getting an average of the kilowatt hours sold per month.

Mr. Goodwin: The per capita consumption of energy, and the industry's products, appliances, and so on, amounted to $30; that is, the total of appliances and energy. The energy consumed, of course, has gone up proportionately with the general increase. The average rate on the Pacific Coast I am not in a position to give you definitely off-hand, but I would say that the residential rate amounts to about seven cents, and the average commercial rate amounts to about three cents. Success on the coast is due not to the low rate of energy, but to the intensive selling methods the organization has employed in the industry in that section. The California campaign is a matter of print, and I shall be glad to furnish you with a copy to show how they work on a co-operative plan in that section.

It is not due to any low rate for current, but to intensive selling and advertising and publicity and the popularizing of the industry's product that the success mentioned has been achieved.

Window vs. Newspaper Advertising

Mr. Hicks (Oshawa): I would like to ask Mr. Goodwin with regard to advertising, whether he considers window display better than newspaper advertising. I refer, of course, to a proper, up-to-date window display, with life in it as well as appliances.

Secondly, I would like to ask him about the feature of the central station managers and superintendents having all the useful appliances in their own homes. Appliances such as the range, the washing-machine, the toaster, the vacuum cleaner, and so on. I think it would be a good idea to take a census of the number of managers and superintendents present here today who are using such appliances.

I would also like to know whether the hardware stores have become factors in retailing electrical appliances, and as to what methods Mr. Goodwin would suggest to stimulate the sales of household appliances.

Mr. Goodwin: Window display and advertising should go jointly in any campaign. The biggest asset a dealer has is a good location and a good window display, because the window display is the most inexpensive means of advertising he can employ. It is the most direct means. The department store has set the best example in that respect. They employ professional window dressers, and if there is anything delights the hearts of the ladies of the land it is to stroll up and down the streets and look into the windows of the great department stores. The dealer has the window at his command, and that is the best means he has of attracting the public to his store. If he can afford to supplement it with newspaper advertising, it is desirable that he should do so.

In the past the dealer has been handicapped by the fact that he had no knowledge of window-dressing, and even if he had, he was not supplied with the proper facilities to dress his window. The manufacturer, generally speaking, has been deficient in not supplying proper window-dressing materials, but within the last couple of years the manufacturers have given a great deal of thought to that side of the question and are today spending enormous sums of money to equip the dealer—and when I use the term "dealer" I include the central station also selling appliances—with proper facilities for window-dressing and display. I know two or three manufacturers who are right now working on uniform window displays with interchangeable cards that will be supplied to the dealers or the central stations with stores, by means of which the window can be readily changed.

We must make it easier for the contractor-dealer to dress his windows. Some of the manufacturers in the States have employed professional window dressers ,and they are sending them around to dress the windows of the dealer and the central station, with the idea that the dealer and central station will delegate a man to accept this training and do the window dressing himself. Window dressing is a business. It is a mistake to put a lot of dumb animals in a window and expect the public to walk up and show a lot of enthusiasm. I would say to the ordinary dealer that the window display is the biggest asset he has.

The Hardware Store

With reference to the hardware store, it has simply filled a popular demand. The electrical man has not properly gone after the business, and the hardware man is simply filling the demand. He will always be a medium of distribution, and will also sell a percentage of electrical material and his business will increase, but the total sales by him will decrease as we employ more intensive methods. The very nature of our product will call the public to the specialists' shop if the goods are presented in such a way that they will appeal to the public, and we can render a special kind of service that the hardware or department store cannot render. The business will flow through our channels, but the hardware store will always be a factor. He will always pick up a lot of the drifting trade that comes along and his business will increase. If he sold 15 per cent. of the product in the past he will perhaps sell 5 per cent. in the future, but that 5 per cent. will represent a 200 per cent. or 300 per cent. increase over his present volume of business. There is nothing to fear in the competition of the department and hardware stores. They will vend the cheaper lines of product than we, and will employ bargain sale methods. They will parasite our industry as far as we permit them to do so. They will lose a dollar in the sale of the flat-iron in order to soak the consumer with $3 or $4 extra on a white goods sale, but I do not believe that any reputable manufacturer in the electrical industry will tolerate his product being distributed through that type of merchant.

In the United States we are permitted to select our own customers ,and I do not believe the manufacturer will select the bargain sale type of merchant as the means of distribution. The electrical people should sell the high-grade product, and if they do so they will acquire a reputation in the minds of the public that will secure their patronage.

Standard of Wiring

About what is being done to improve the standard of wiring: I think organization is causing the contractors to appreciate their responsibility to the industry, and has done more to elevate the standard of wiring than any othe rthing. Recently in New York we arranged meetings betwen the Institute of Electrical Engineers and the American Institute of Architects, and we are now drawing up standard specifications of various types of jobs, and by elevating the standard of the specifications put out by the architect and the engineer better work will be produced by the contractor. You could drive a horse and wagon through most of the specifications you find now. Then the fact that a lot of contractors have been writing their own specifications for architects and engineers has been a bad business. It has precipitated dishonorable methods among the contractors. The contractor who writes a specification thinks he is in an advantageous position, and puts a lot of jokers in the contract, and the other contractor knows it.

We must have the specifications written by engineers who make it their business to write specifications, and then we will have a great improvement along that line. With the development of the contractor into a merchant with a store to back up his contracting business he will be less dependent on contracting, and there will be a tendency to do time and material work rather than contracting work, and as soon as you get the contracting dealer to say "I would not like to take a contract for wiring your house, but I will do a real good job for you on a percentage basis," he will make more profit on a good job than on a poor job The tendency seems to be to drift away from taking the job on a contract price except in the case of large installations where a good character of work is generally performed.

Receptacles and Plugs

With regard to standardizing receptacles, in the United States the question is being dealt with by five or six of the manufacturers. They had agreed on a standard, but these various devices were patented and each fellow thought his device was the best. I suppose you have the same jealousies in Canada. I think, however, that the combined strength of the electrical industry should be enough to make these fellows standardize. Put them in a room and lock the door and deprive them of water and food and say "You don't come out until you standardize!" If you cannot get them together in that way let each and every man in the electrical industry concentrate himself on one article, and then the majority of them would be obliged to give in. It is selfishness on the part of the manufacturer that is holding the whole industry back. We should be ashamed of ourselves to sell a woman a flat-iron for $5, $6 or $7, with a cord and plug, a toaster with another cord and plug, and still another device with another cord and plug, and so on. I have 40 devices with a cord and plug for each one, and not one interchangeable. Why should we have to buy a cord and plug every time we buy another device? It is a fool proposition, and we are not getting anything out of it. We not only want the means of connecting them in, but also the devices themselves standardized as to terminals, so that every device using a certain wattage up to 500 or 1,000 watts will have one kind of plug, and every other device above that some other kind of plug. I would like to see this organization pass a resolution and then go and talk in real, understandable language to the manufacturer who will not agree to standardization.

Mr. Phelps (Sarnia): Have the Contractors' Association in Ontario men they can send out into the country to give the contractor-dealers information? In the city of Sarnia we have four or five contractor-dealers whom I have been trying to get together to accomplish something, for some time past, without success. My object is to enable them to give the public a better service in our city, but they all seem to be jealous of one another.

Mr. McIntyre (Toronto): We have neither the funds nor the time to make a regular business of educational work. At the same time, if Mr. Phelps of Sarnia will send a request to our Association, I will either come up myself or get somebody to go up. Within the past week I have held meetings with the contractors in Hamilton and Kitchener, and am now in communication with Ottawa.

Contractors' Specifications

Mr. Goodwon mentioned specifications by contractors. There are a great many advantages in that. As you probably know, we have been forced to do it by the almost absolute ignorance on the part of the best engineers of matters pertaining to interior wiring. I do not think any of you will disagree with me on that, because very few engineers in Canada today have experience of inside wiring, and our Association officially stated our position at a meeting last winter of the Toronto section of the American Institute of Electrical Engineers. We said we would be only too glad when there were enough engineers to standardize, to bring high-class work to industrial and domestic installations.

I would like to ask Mr. Goodwon a question which has been put in my mind by several outside of Toronto contractors: Granting that the proper policy for central stations is to specialize and to emphasize campaigns to exploit and develop new devices, does it necessarily follow that the central station, whether publicly or privately owned, should have to go into the retail business to attain that end?

In Toronto we have the Toronto Electric Light Company and the Hydro-electric System both carrying on great stores. As far as I know, neither of these systems is cutting prices. But there is hardly a decent electrical shop in Toronto of the kind Mr. Goodwin sets up as the ideal. There is not one to my knowledge. Going out of town to the various municipalities in Ontario where the local system has no electric shop the contractor-dealers have shops 500 per cent. better than those in Toronto. So I ask the question: Is it better for the central station or the contractor-dealer to open a retail store?

Advertise the Specialty

Mr. Goodwin: If I were running a central station and had an appliance department, I would concentrate my advertising on the specialty article, I would not waste five cents advertising a flat-iron. I would concentrate my efforts on the new goods that came out, such as an ice machine, or a dish-washing machine or an electrically operated sewing machine—something new.

The thing is to get the public to buy from some place. There are a certain number of people in the community who prefer to deal with the independent merchant and others who prefer to deal with the Hydro. If the central station is going to run a campaign, why not have a family campaign? Why not all get into it? If we are going to put on a campaign in connection with washing machines, why not everybody get into it?

In Albany they were selling about five dish-washing machines per week to the whole community. A campaign was put on, and everyone of the dealers was permitted to display washing machines in the central station display room, and to send their demonstrators there to demonstrate them. They put a colored girl in the window with an old washing tub and right alongside of her a modern electric washing machine, and they sold 250 machines in two weeks!

Then there arises the question of instalments. All these higher priced devices must be sold on the instalment basis, and it is the simplest thing in the world to provide a means of financing instalment sales. Many of the small dealers cannot carry the instalment business, but you cannot sell washing machines for cash in any quantity, and the same remarks apply to vacuum cleaners, dish-washing machines or sewing machines. The small dealer cannot finance the instalment sales, and in the absence of his ability to do so the utility, the manufacturer or the jobber should do the financing. If they are unable to finance then they should go collectively to the bank and work out a co-operative plan of financing.

Financing Instalment Plan

In the United States we have provided through our modern system of banking a means of financing instalment sales. I have a copy of the whole plan here and would be very glad to leave it with you if you are interested. In the city of Chicago very recently the groups have come together, and the Commonwealth Edison Company have offered to finance the instalment plan. I believe co-operation will produce a better result. I believe business will be set back if the utility goes out of the appliance business. I think they should concentrate their efforts on the new devices. The old devices, such as the iron and the toaster, will automatically sell themselves. I have learned from sad experience that in the communities where the highest degree of co-operation is developed and the central station has gone out of the retail business the contractor-dealer got right back into the rut. The contractor-dealer needs some sort of stimulation to keep him inspired to greater effort.

Mr. McIntyre: I did not intend to suggest that in Toronto the systems should go out of the retail business. What I intended to ask was whether in the case of communities which were already being well served by the well-run local shops in co-operation with the local system, should the local system there go into the business? I will ask this additional question: If that system did have it under consideration, would it not be best to consult the local contractor-dealers before taking any such step?

Mr. Goodwin: I would say that would evidence a spirit of co-operation, but I would have to be shown the community in which any contractor-dealer was properly cultivating all the business, and developing an intensive market. There is no such thing as saturation. They have not yet reached saturation in the case of the old foot-power sewing machine. We cannot think of saturation. I would say that if I were runnning a central station even where the contractor-dealers were rendering good service, I would go into the appliance business and would co-operate in such a way with the contractor-dealer that we would be better friends every day. I do not think the contractor-dealer is enough of a merchant to appreciate the importance of this job, nor has he the financial ability or experience to carry the job along, and I believe if the central station goes in and co-operates, the business will increase.

Compensation for Services Rendered

Mr. Merrick: I would like to ask Mr. Goodwin to draw a distinction, if he can, in regard to compensation in connection with jobbers and central stations. I do not know whether Mr. Goodwin is aware of our situation here, but I would like to ask him if that remark refers to the Hydro utility store or municipal store. The Hydro Power Commission of Ontario at the conclusion of last Janury's Convention (the last time we had the pleasure of hearing Mr. Goodwin speak, and the substance of which speech we feel we have absorbed and made every effort possible to put into effect all throughout the system) carried out every detail of the work that was possible. In that connection we have incurred considerable expense. We have got the manufacturers, the energetic manufacturers, to come out and co-operate with us in the great work of revolutionizing the question of sales in Ontario, and where it has been necessary to open a new store we have invited the local representative of the manufacturer to join us. Such work we feel is worthy of some compensation. Therefore, I ask Mr. Goodwin is not some compensation due to the Hydro Power Commission in the capacity of an exploiter and in jobbing or re-sel'ing a commodity?

Mr. Goodwin: I woud say yes. You have raised a question which is fundamental, and if not properly handled will lead to a very serious situation. I take it that at least some of the manufacturers are not granting to the Hydro what you consider fair compensation for the services you render. Now, it all depends upon the approach you make to that particular manufacturer. We must be absolutely fair and broad-minded in this whole proposition. There exists to every electrical manufacturer in Canada a real menace in the Hydro if you exercise to the extreme your power to purchase. What I mean is this: If I were an electrical manufacturer in Canada I would hesitate to put myself in the position of marketing my commodities through the Hydro because of the tendency to make me dependent on you as my sole outlet. In other words, if the Hydro system develops along the line that each of these respective communities purchase their own requirements and their own particular style and designs independent of any other plant I think the manufacturer will willingly and gladly give you proper compensation for services rendered, but if the tendency on the part of the Hydro system is to develop concentrative buying through a central force and uses its purchasing power to squeeze the manufacturer down to minimum prices for his product and compels him to use the Hydro as an outlet, I would fight you. Let us take the question of meters. Supposing someone gets up in a metting like this and says we should go to one manufacturer and give him all our meter business based on the total consumption of all these various plants. You would say that is a good idea, and we will do it. That, however, means that one manufacturer is going to get the business. Let us carry the idea to the extreme. Let us bring all the plants in Canada together and apply the same principle, apply the combined purchasing of all the plants to a single meter. You have one manufacturer of meters and you are going to drive everybody else out of the business. Temporarily it is a fine thing for you, but God help you when that manufacturer drives everybody else out of business!

Concentrated Buying a Menace

Let us take another situation: I do not know how many meter manufacturers you have in Canada. Combine your purchasing power and concentrate on one manufacturer. In Ontario your demand is unusual, and the manufacturer must provide facilities in order to take care of this one very desirable purchaser (very desirable while the going is good), but at the end of the year somebody in this room gets a grouch and says "I prefer the Westinghouse. I like the aluminum cases," and so on and say "We will divide this up and give it next year to the Westinghouse or the Canadian General Electric," then what is the fellow who has put a lot of money into this meter business going to do? He has a factory and a lot of men and a lot of capital tied up, and he will close the whole plant out, and the other fellow is going to build a new factory and steal the men that the other manufacturer trained up. What would you do? The manufacturer would be a fool who would put money into that scheme with the uncertainty that is bound to come through concentrated purchasing power. You must never get the manufacturer in the position where you become a menace, because he is going to fight you.

A Voice: What about concentrated selling power?

Mr. Goodwin: Just as bad as concentrated manufacturing if you put it on your product. The greatest development will come with the greatest diversity of manufacturing intitutions. The greatest development in the electrical business will come with the great diversity of manufacturers, but if you put all your manufacturing into the hands of one man he will become lazy. I can sense what the manufacturers in Canada and the United States fear. I think it is bad to concentrate the manufacturing to one single unit, so that you are dependent on a single company. I think it is bad for a manufacturer to be dependent on a single purchaser. There is a real menace to you as well as to the manufacturer, to the people of Canada as well as the men in the industry if you concentrate your purchasing power. I think it would be a very unwise thing for the Hydro Commission to attempt to constitute itself a distributing medium if that is your scheme.

Mr. Merrick: I think that applies equally to every manufacturer in the electrical industry. I further take it that the question of compensation regarding the utility store or the Hydro Power Commission as a whole is one directly for the Hydro Power Commission to deal with. In that connection I will ask who is going to further the idea of a "Goodwin plan" in the province of Ontario where we as energetic electrical men are desirous of having it applied if not the Hydro? Mr. McIntyre made remarks a moment ago about not having a man permanently employed to go out and organize the contractor-dealers. May I state that we have in many cases assisted you, and I think I can find sufficient support in the room to confirm that Mr. Phelps offered his services to organize the contractor-dealers.

If I am wrong in interpreting the Goodwin plan at this late date I would be very glad to have it explained now, because we are very desirous of working along ethical lines rather than antagonistic lines. It is a new plan and we are open for education. If we are wrong we want to be set right.

Mr. Goodwin: I do not understand that you have a wrong interpretation, and I do not know that I have said anything that differs from what I have said before.

Manufacturer on Defensive

In answer to your question about compensation for services rendered, I say you should get that. I attempted to picture what I thought was the reason why you had not received it. That is a question that perhaps has nothing to do with my plan. It is a question of an individual manufacturer trying to preserve himself, and I can see why a manufacturer would hesitate to give compensation to the Hydro or anybody else if he thought that compensation meant his own destruction.

The Goodwin plan does not contemplate the idea that any man is going to submit to a proposition that means his own destruction. At the same time I attempted to point out what I thought would be a menace to your business if you attempted any such methods of concentrated purchasing. Let us assume that the Hydro elected to go into the jobbing business. There is nothing in my plan that would prevent them doing so, but they would not and could not go in and develop an equal kind of competition with other jobbers. The other jobbers would have to go out and sell their wares on the basis of services rendered. They would have to present real good selling arguments in order to convince you or a contractor-dealer to buy his wares. But if the Hydro went into concentrated purchasing for the purpose of obtaining a low price it would result in the contractor-dealer sitting back and acquiring the habit of laziness. We lose sight of the fact that the success of a business is not made by the price we purchase a commodity at. There is no money made in the purchase of anything, and you men in the operation of your plants will not make money by purchasing in quantities at low prices. You make money when you sell an article, whether it be real estate or merchandise or electrical energy. The way you purchase very often determines the type of market you are going to sell. A week ago you could buy stocks and bonds at one hundred and forty, and two days ago at one hundred and twenty, but who wants to buy stocks or bonds on a declining market because they are cheap? Every business properly run works on the law of percentage, a certain percentage for overhead is added to the commodity, and the percentage of profit made on a dollar is more than the profit on eighty cents so long as you can sell satisfactorily to the public. There will be no success in your Hydro development in your concentrated purchasing power. The little you might save through enjoying a quantity discount will not help you, because I have attempted to point out that the big job is to sell the idea to the public, and price does not enter into it. The Hydro wants security, but the healthy development of Canada demands that you give security to the electrical manufacturers, too, because if you kill them off and become dependent on the United States and England for your product you will see the manufacturers in those countries soak it into you.

Mr. Merrick: Compensation for services rendered, as I understand it in regard to jobbers, is a standardized principle among manufacturers. This exploitation work which Mr. Goodwin mentioned in Janury last is very expensive in regard to ice machines, dish-washing machines, and other little-known appliances. I would like to ask Mr. Goodwin to make a statement as to the distinction he would draw between allowing compensation to the Hydro for services rendered and anybody else?

Mr. Goodwin: I have said I cannot see any distinction between allowing compensation to the Hydro and anybody else for services rendered. There is no argument there at all. It is absolutely sound, sensible business. The only reason that would prevent it is the one I attempted to point out, where a manufacturer sees ahead of him a menace. Self-preservation is still the first law of human nature, and compensation disappears when a menace appears. You would have to be more specific and cite the manufacturer and the particular commodity, and the rate of compensation.

Proper Compensation

Let us take a specific case in the United States: Some of the contractors say that the compensation allowed by the manufacturer on the sale of motors is insufficient to cover the cost of handling and selling them, and the manufacturers say the cost is excessive. I say to the contractor: "You make a contention. Where are your costs?" The contractor says "I do not know, but my judgment dictates that I am losing money on the sale of motors." In other words, he knows nothing about it.

The motor business in the United States amounts to possibly $35,000,000 a year and the contractors ask $3,500,000, 10 per cent. I would ask anybody for that myself. I would not be a fool in asking for it, but you would be a fool in giving it to me.

The manufacturer on the other hand says the compensation is sufficient, and I say to him "Let me see your figures to prove it is sufficient," and the manufacturer does not know, and there we are with locked horns. We have to get statistics to prove the case.

A man in Cleveland named Oppenheim was interviewed and said "You are preaching compensation. Before you do so, why don't you tell the General Electric to give us decent compensation so that we can live? I said "I don't know why the General Electric do not give you decent compensation, but as I recall your sign over your door it reads: 'Oppenheim, the price-cutter,' and you are the worst price-cutter in Cleveland, and I take it the manufacturer has been giving you too much compensation." We get back to the proposition: What is the right basis of compensation? The best way to measure it is to feed it to the dealer, jobber and Hydro in small doses, and immediately he starts to cut the price withhold it. You in Canada are the worst lot of price-cutters I ever saw. You must be getting too much compensation or you would not be giving it away. You are getting compensation from the manufacturer for rendering a service, and instead of keeping it as your profit you give it away. The answer must be that the manufacturers are giving you too much. The compensation should never be any more than a man will keep. Perhaps the Hydro have given it away, I don't know. If you will tell me the specific case I will endeavor to give you a better answer, but while we are talking in generalities that is the best I can say.

Mr. Shearer (of Smith Falls): I think the conditions suggested by Mr. Goodwin and the remedy therefore lies with the individual local sales manager. He is not compelled to buy from the Hydro Power Commission, and if they suggested we stock up with one line of goods the province over, I think we would be very foolish, because I think the most of us will agree that where we have a varied stock we will in a good many cases make a sale that would have been lost if we had only one line of the same article. I mean if we were stocked up with only one manufacturer's irons and no other irons there would be a good many cases where we would not sell an iron because we did not carry a cheaper line. It lies with each individual sales manager to stipulate the stock he will carry, and in that way we can vary the stock.

Protection for Dealer

I would like to ask Mr. Goodwin in regard to the instalment plan how he would protect either the jobber or the central station gaainst being fleeced by spurious customers in the case of house-wiring. Where there is an appliance we can protect ourselves through a lien, but I do not think we would stand much of a chance of attempting to remove the wiring from a house if it was not entirely paid for and the party left the country or refused to complete the payments. It seems to me the house-wiring proposition should be a cash one.

The product we have to sell cannot be sold for cash in any great quantities.—W. L. Goodwin.

Mr. Goodwin: Of the choice between the selling of appliances on instalments and house-wiring on instalments so far as security is concerned, I will take the house-wiring. We know from experience of over 20 years in every line of endeavor that the credit losses on instalment sales are less than 1 per cent. As a matter of fact, they average one quarter of one per cent. in the case of all the big instalment houses throughout the United States. You are selling to what might be regarded as the most unreliable kind of purchaser, the one that has to buy on the instalment plan, but there is something about the people of this continent that makes them keep their instalment payments as faithfully as they will keep their religion. If you give a man a washing-machine on sixty days' credit he will beat you right and left, but if you sell it on the instalment plan you won't have to chase him all over the country. In the case of house-wiring, however, he cannot move it away and it becomes a lien on the building all the time.

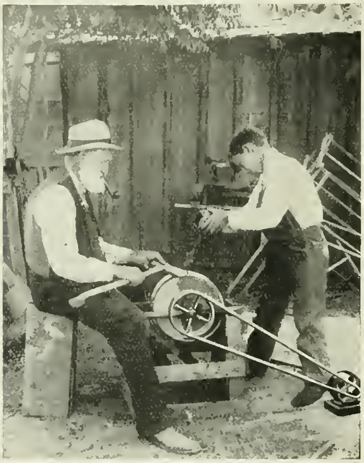
The President: Before we adjourn there is a resolution to be discussed in regard to the Standardization of Plugs and Receptacles.

The following motion was carried unanimously:—Moved by Mr. R. H. Martindale, seconded by Mr. J. E. B. Phelps:

> That this Association urge that all reasonable steps be taken to introduce into this country a standard plug and receptacle for all appliances, and that the Standards Committee take active steps in this important matter.

Electricity Helps the Farmer

The Matthews Engineering Company have issued an attractive new booklet on farm lighting and power plants from which the accompanying illustration is taken. Any man, if he was once a boy on the farm, will understand this young gentleman's appreciation of the work of the little electric motor. This is the plant handled in Canada by the Northern Electric Company.



Think about it for a moment.

One of the most complete farm installations that has come to our attention is that of J. W. Cameron, who lives near Readlyn. Mr. Cameron's buildings are all of first-class construction, and are electrically lighted throughout. Over the door of his garage is a lamp which lights the walk from house to barn, and is controlled from four points. Thus there is no need of a lantern, as the light can be turned on at the house, and extinguished on reaching the barn. In the barn is a 7½ h. p. motor driving a Bowser feed mill. Experience has shown just where to set the slide gate in the feed-chute so that the mill gets just enough unground oats and corn, and so it runs without attention. Nearby is a 1 h.p. motor belted to a shaft formerly driven by a windmill. This shaft runs outdoors to a pump which delivers to a concrete tank from which pipes run to various watering troughs. One of these troughs which serves the beef animals, is placed in the wall of a shed so that it can be reached from without or within. Formerly there was trouble with this freezing, but Mr. Cameron has put in a little electric immersion heater, taking 500 watts, which effectively keeps the water ready to drink. Since there are about 150 head of cattle the saving of this device is obvious. The motor-driven feed cutter, too, means no hauling of feed over heavy roads, and no shortage of ground feed at any time.

Electricity lightens household tasks too, and Mr. Cameron isn't one of these men who keep all the conveniences for himself. His house is well lighted throughout, and has a complete plumbing installation, supplied by a small rotary pump driven by a 1/8 h.p. motor. This pump delivers into a 3 ft by 6 ft. pressure tank. In the laundry is a combined washing machine and wringer driven by a 1/4 h. p. motor. In summer Mrs. Cameron's kitchen is always cool for she uses an electric range. This has three burners on top and an oven underneath. In winter, too, there is no fear of fuel shortage, and no delay should the range fire go out. Other household equipment is an electric flat iron, a sewing-machine motor, and an electric vacuum cleaner. In the garage is a motor-driven grinder which keeps tools sharp.

Mr. Cameron has a farm of 320 acres, on which he usually feeds 150 head of cattle and 300 hogs. His electricity bill totals $8.00 to $10.00 per month. Current is purchased from a nearby central station which operates a 2300 volt distributing system. As is customary in this community, each user pays for his share of whatever line connects with the nearest distributing line. He also pays for his transformer, a 7½ kw., and protective devices. The central station instals the meters. The rate for current decreases with the amount used, thus making it easy for the farmer to run several motor driven devices. His equipment is all Westinghouse. By their aid it is possible for Mr. Cameron with the help of one boy, to take care of his stock during the winter alone and in the summer to concentrate his time on really productive work.

The strike of electrical wiremen in Montreal continues, the principal contractors declining to accede to the demands of the union for 75c an hour. The officials of the latter asserted that the Administrative Commissioners had decided to substitute in city contracts the union scale and conditions for the fair wage schedule previously adopted, but the commissioners explained that this was only temporary in order that urgent work be done, and that the city would be willing in the future to pay a scale agreed upon by employers and the men. A deputation of the Electrical Contractors Association of Montreal, (affiliated with the Association of Montreal Building & Construction Industries), consisting of R. Moncel, H. Vincent, F. J. Parsons, W. Shaw, E. J. Gunn and Fred Smith, with Mr. D. K. Trotter, secretary, saw Mr. E. R. Decary, chairman of the Commissioners, and protested against the city paying rates beyond those current at the time contracts were given out, and also against the alleged decision to employ none but union men. Mr. Decary explained the reason for the temporary payment of 75c an hour, and declared that no arrangement had been made whereby only union men would be employed.

It is reported that dealers, having exhausted their supply of electric fans due to the abnormally hot weather during June, are hesitating to replenish their stock lest the temperature takes a drop. It might be well to remember, however, that we are just at the beginning of our ordinary summer and, in all probability, have practically two months of "fan" weather ahead of us. The contractor-dealer has more than a sporting chance to make a big turnover on this line yet.

"Our Army & Navy" of Washington, D. C., edited by Captain J. Walter Mitchell, devoted a page and a half in its December issue to an "appreciation" of Mr. Louis Steinberger, president and general manager Electrose Manufacturing Company, Brooklyn, N.Y. Mr. Steinberger is evidently one of those rare characters who doesn't tell his left hand what his right is doing—particularly when it's making large and frequent subscriptions for patriotic purposes. The electrical world has long known Mr. Steinberger as an inventor of note. They will be no less pleased to know him in the other capacity.

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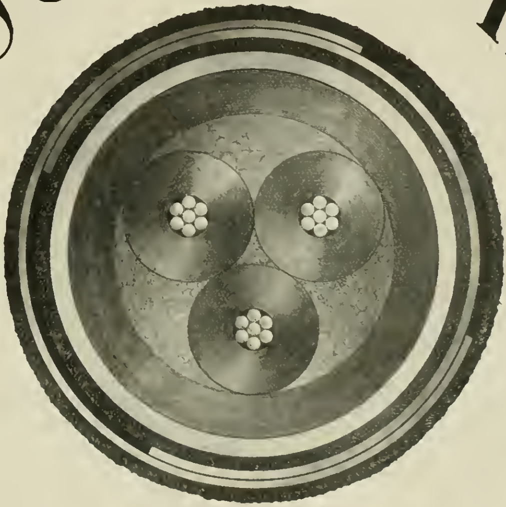

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Branches: Toronto, Winnipeg, Regina, Calgary, Vancouver

Current News and Notes

Creston, B. C.

The East Kootenay Light and Power Company propose extending their lines to serve Creston, B. C., and the surrounding district.

Drummondville, Que.

The new plant of the Southern Canada Power Co., at Drummondville, P.Q., is now in operation. The present capacity is 7000 h.p., and the ultimate capacity 18,000 h.p. The equipment includes two 3,150 kv.a. 60 cycle 2,300 v. a.c. generators, direct connected to vertical turbines, under a 32-ft. head. The transformers are 1000 kv.a., oil insulated and water cooled.

Fredericton, N. B.

Improvements and extensions to the amount of approximately $175,000 are announced for the current year by the New Brunswick Telephone Company. New copper circuits for the North Shore section are included in the estimates.

Kitchener, Ont.

The Waterloo-Wellington Railway, operating between Kitchener and Bridgeport, has been offered to the city of Kitchener at a price not yet stated.

Montreal, Que.

The Duncan Electrical Co., Ltd. of Montreal, announce that they have made arrangements with Mr. L. A. Cochrane, of Winnipeg, late of the Northern Electric Co., Ltd., to assist in the furtherance of sales for Duncan Products throughout Western Canada. Mr. Cyril B. Clarke, of Geo. Clarke & Son, Halifax, will perform the same duties for the Duncan Electrical Co., Ltd., in the Maritime Provinces.

The Modern Electric Machine & Equipment Company, Montreal, have registered.

The fares of the Montreal Tramways Co. will have to be again revised—doubtless in an upward direction—owing to the increase of $1,300,000 in wages now being paid to the empolyees. The Tramways Commission are now studying the data for the new schedule.

The Sewing Machine & Electric Supply Company, Limited, Montreal, have registered.

The city of Outremont, P.Q., propose to spend $13,000 on electric light extensions; $7,500 on underground conduits; $15,000 on burying cables, and $5,000 on poles, etc.

The Safety Electric Company, Montreal, have registered.

Ottawa, Ont.

The General Electric Supply Company, Ottawa, Ont., have closed their branch store.

Owen Sound, Ont.

A new electric store has been opened in Owen Sound, Ont., by E. B. and F. J. Potts, who have just returned from overseas. The firm name will be "The Sound Electric Company." They will carry on a general contractor-dealer business.

Pembroke, Ont.

The town of Pembroke, Ont., will, in co-operation with the Pembroke Electric Light Company, remove all the present wires and poles from the main streets and install modern "white-way" standards. Additional improvements to the lighting system will be made in other sections of the town.

Parry Sound, Ont.

The town of Parry Sound, Ont., has let contracts for the installation of a hydro-electric plant which will contain two units. These will be approximately 650 and 1050 h.p. turbines driving 425 and 750 kv.a. generators respectively. Power will be obtained from the Seguin River and the work of erecting the dam is already under way by the W. M. Fletcher Company, 55 Bloor Street West, Toronto. The generators are being supplied by the Canadian Westinghouse Company. C. H. & P. H. Mitchell are consulting engineers.

Regina, Sask.

A general advance in rates on the government telephone system in Saskatchewan will be made on September 1st.

Sydney, N. S.

A committee from the town of North Waterford, N. S., recently waited on the officials of the Cape Breton Electric Company asking that the railway be extended to that town.

Toronto, Ont.

The Nitro Electric Company, Toronto, is named among recent registrations.

A deputation from the Belleville city council and board of trade recently waited on Premier Hearst asking assistance in the development of iron mining in the northern part of Hastings county. It was pointed out that the government could help by securing cheaper power. The present rate is $17 per h.p. The premier promised an investigation.

The Automatic Electrical Display Company, Toronto, have registered.

The Electric Works Company, Toronto, have registered.

The Ontario Fixture and Electrical Company, Toronto, have registered.

Vernon, B. C.

A meeting was recently held at Vernon, B. C., to discuss a proposed hydro-electric power development at Shuswap Falls on the Adams River to serve the entire district from Kelowna to Kamloops. Among the benefits would be the electrification of the Kamloops-Kelowna branch of the C. N. R., cheap power for industrial purposes and electric lighting, as well as for irrigation pumping. The matter will be discussed further at a municipal convention to be held at some central point.

Windsor, Ont.

A by-law designed to grant the Sandwich, Windsor and Amherstburg Railway Company a straight five cent fare was defeated by a large majority.

Winnipeg, Man.

A newspaper report states that the Winnipeg River Power Company, backed by Mackenzie and Mann interests of Toronto and allied closely with the Winnipeg Electric Railway Company, has started work on a large power plant at DuBonnet Falls on the Winnipeg River, 75 miles north-west of Winnipeg. The ultimate capacity, it is stated, will be six units of 28,000 h.p. each, or 168,000 h.p., and the project which will be completed in three years, will cost $7,000,000.

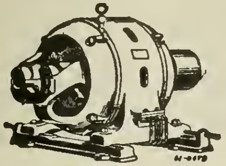
Personals

Ald. E. W. Sayer, of the Sayer Electric Co., Montreal has been re-elected trustee of the City of Outremont Protestant Schools by the ratepayers of the city.

Mr. V. Laursen, of the B. C. Electric Company, Vancouver, was recently in Oakland, Cal., attending the tenth annual convention of the Pacific Coast Claim Agents' Association.

Major T. E. Ryder, D.S.O., M.C., has been appointed general manager of the Rudel-Belnap Machinery Co. Ltd., Montreal. Major Ryder recently returned, in command of the 7th Canadian Siege Battery after four years overseas service.

Lighting Fixtures—Catalog issued by Trans-Com. Lighting Products Corporation, New York, illustrating and describing special lighting fixtures for public buildings and residences; electrical conduit fittings and boxes and marine electrical appliances.



We have the following new and second hand

MOTORS FOR SALE at very attractive prices

550 Volts, 3 Phase, 60 Cycles.

No.	Horse Power	Speed	Make
2	200	600	Allis Chalmers Bullock
3	150	600	Allis Chalmers Bullock
6	125	720	Crocker Wheeler
1	125	720	Slip Ring
5	100	900	Lincoln
4	75	900	Lincoln
1	75	1200	General Electric
4	50	900	General Electric
3	40	900	Lincoln
1	40	900	Slip Ring
18	30	1200	Crocker Wheeler
20	25	1200	Crocker Wheeler
25	20	1200	Crocker Wheeler
2	15	900	Lincoln
6	15	1200	Crocker Wheeler
4	15	1800	Lincoln
20	10	1200	Crocker Wheeler
2	10	900	Crocker Wheeler
23	7½	1800	Crocker Wheeler
26	7½	1200	Crocker Wheeler & C. G. E.
1	1½	900	Wagner
60	5	1800	Crocker Wheeler
25	5	1200	Crocker Wheeler
7	5	900	Crocker Wheeler
32	3	1800	Crocker Wheeler
15	3	1200	Crocker Wheeler
4	3	900	Crocker Wheeler
11	2	1800	Crocker Wheeler & Lincoln

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You Need This—the Martin Portable Vise Stand and Pipe Bender, because it will save you time and labor in the shop—and outside as well, for it can be moved anywhere with ease. It cuts the cost of cutting, threading and bending conduit.

Patented in Canada

Write today for 10 days' free trial.

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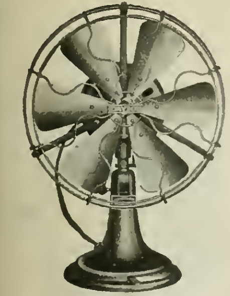
Strong Selling Features of Durable Daytons Mean Real Profit for Dealers



Illustrating Durable Dayton No. 676

Six blade 12 or 16 inch Oscillating Fan, convertible to bracket position.

Durable Dayton Fans are easy to sell and good to sell because of their quality—they mean satisfied customers and repeat orders—Dayton fans are sturdily made, for long, untroubled service. They consume less current and their square-end blades deliver more breeze.

The line is complete, including electric ceiling, desk, and wall bracket models for alternating and direct current, exhaust fans and water motors. Easily adaptable; all Dayton desk fans can be immediately converted into the wall bracket type.

Opportunity to "Cash In"

Demand is for quality now, stronger than ever before—Daytons have held the fan quality leadership for 26 years, the best fan for every purpose.

Durable Dayton dealers are given co-operation; sales helps and advertising that brings in customers and profits.

Write for Catalogue and Prices Now

DAYTON FAN & MOTOR CO.

DAYTON, OHIO

Condensed Department

Publisher's Notice

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

WANTED TO PURCHASE

Wanted to purchase in quantity—2 H.P., 3 H.P. and 5 H.P. Motors, 550 Volts, 3 Phase, 60 Cycles. Write Box 983, Electrical News, Toronto. 14-15

Ten-Cent Fares for Bay State System

The public trustees of the Eastern Massachusetts Street Railway, Boston, Mass., voted to withdraw on July 1 the 7-cent tickets and tokens from the Bay State system. It was announced that on and after that date the initial fare north and south of Boston would be 10 cents, as it has been since Jan. 8 for a single cash fare. The 7-cent tickets and tokens will be redeemed at 7 cents each.

The public trustees took possession of the property on June 1. An estimate of the earnings and expenses for the month indicates a deficit of approximately $300,000. Nothing was earned toward interest charges or the principal of the State guaranteed bonds.

Steps have been taken by the public trustees substantially to reduce the management expenses throughout the system. Notwithstanding these economies, neither an 8-cent nor a 9-cent fare would produce enough revenue to meet the cost of service, as provided by law, or even the interest charges, which must be met if the company is to remain solvent.

As soon as the cost of service can be determined accurately in each of the 12 districts under the home rule plan of operation and accounting, which also goes into effect July 1, the fares in these districts will be changed accordingly.

It is the intention of the public trustees to issue at frequent intervals statements showing the receipts and expenses of each district.—Electric Railway Journal.

PETRIE'S LIST
of NEW and USED
MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
1	75	3	25	550	725	Westg.
2	52	3	25	550	720	Lancashire
1	50	3	25	550	720	Westg.
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	30	2	60	220	720	F.-M.
1	25	3	25	550	1440	J. & M.
1	25	3	25	550	720	Lancashire
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	15	3	25	550	710	Chap. & W.
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	J. & M.
1	7½	3	25	550	1500	Lang-Dav.
1	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
1	5	3	25	550	750	C. G. E.
4	4	3	25	550	1400	Excelsior
1	3	3	25	550	1500	C. G. E.
2	3	3	25	550	1400	Excelsior
1	1	1	60	220	1750	Wagner
1	1/6	1	60	110	3400	Diehl

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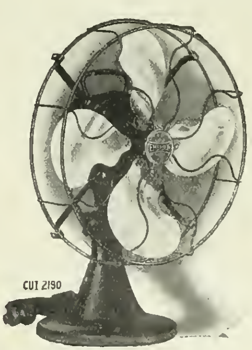

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Pulverized Coal Opens up Possibilities of Future Economies

In considering ways and means of cutting the cost of operating our various industries, one of the factors that is receiving more attention is the use of pulverized coal. Pulverized coal was used many years ago in the Portland cement industry where pulverizing machines—one of the difficult problems in the way of development—were finally brought to a high state of efficiency. It is now being utilized at the rate of about six million tons annually in this industry.

This form of fuel has been gradually taken up by engineers in other industries. For example, the steel industry uses about two million tons annually; the copper industry nearly as much; it is being applied to railway locomotives where the demand promises to be enormous and, finally, stationary power plants are experimenting and reporting economies over the old stoker system.

Powdered coal, as applied to these industrial phases, is something more than the dictionary definition implies. The coal must be pulverized to an impalpable powder—so that at least 95 per cent. will pass through a 100-mesh sieve, having 10,000 openings to the square inch. The finer the coal is pulverized the more efficiently it can be burned because of the more nearly perfect and instantaneous combustion. Pulverizing coal does not change the nature of the coal, though it does, in effect, change its form from solid to a semi-liquid. As the coal is pulverized it is mixed with air and when handled in a conveyor it flows like water.

Aside from greater efficiency, it is evident that the use of coal in this form would make possible the utilization of much of our supply at present useless. Low grades of lignites and mineral coals with high moisture content, waste coal around steel plants, silt waste at the mines and so on, will, with the development in powdered coal usage, take on a value equal to that of our best qualities at present. A further consideration is its applicability to transport through pipes. The day may yet dawn when our coal supply is available in our homes and factories at the turn of a tap, just as to-day we take water or gas.

Centralized Power Plants in England and Canada

An interesting item appears in the current issue of "Conservation" regarding the application of the same plan of centralization now being organized to take care of Great Britain's electric supply plants, to the western provinces of Canada, where somewhat similar conditions obtain. It is pointed out that the cost per kw. h. in certain sections of our prairie provinces, where demand is small and water power not available, runs anywhere from 15 to 19 cents. Against this sum it is figured that power from a centralized plant could be laid down at about 5½ cents over a radius of 150 miles.

There is doubtless enough force to this line of reasoning to justify a thorough study of the situation though, on its face, there surely can be no such discrepancy as that shown between the two figures quoted of 19 and 5½ cents per kw. h. The load factor of 40 per cent., which is quoted, is probably above the average that could be obtained, nor does the article state what allowance is made for depreciation, sinking fund, etc. If even a figure of 10 cents were possible, however, the expenditure would seem to be justified.

This idea of centralized plants, located advantageously to an easily available supply of coal, so that the question of transportation is one dealing with electricity rather than coal, is not new, of course, but has been the dream of many an engineer. Doubtless the biggest difficulty is the limited, intermittent and widely scattered demand for electric energy. Each year as the western towns grow—and they must grow again, though temporarily at a standstill—the dream will be nearer realization.

Then, too, there is the farmer to be reckoned with. Many a prosperous farmer has a demand equal to the village of former days. This prosperous element in our community, with its telephones, mail delivery, pleasure and utility automobiles, now see enough of town and city life to appreciate the advantages of electric power and light, and —some way or other—he is going to get them. Perhaps it will be in the form of individual plants, but the better way, without question, is the central plant. The farm demand may well be the means of changing our whole system of electrical supply.

Grand Du Bonnet Falls Development

Work has commenced on the new hydro development of the Winnipeg River Power Company at Grand du Bonnet Falls on the Winnipeg River, 14 miles north of Lac du Bonnet. At this point an island in the river forms a suitable location for the main dam, which will be about 2,000 feet long and 70 feet high, of concrete construction. The power house will be a steel and brick structure, 450 feet long by 140 feet wide and 100 feet in height. The design of the plant contemplates an installation of six units of 28,000 h.p. each, or an ultimate installation of 168,000 h.p. The initial installation will consist of two units, or approximately 56,000 h.p. A storage reservoir of 2,000 acres, reaching upstream a distance of five miles, will be formed by the main dam. Power from the new plant will be transmitted to Winnipeg over a double circuit transmission line about 70 miles in length to a new transformer station to be built in Winnipeg. A second double circuit line will connect the new plant with the present line of the Winnipeg Electric Railway Co. from Pinawa to Winnipeg, about five miles south of the town of Lac du Bonnet. The company will thus have the advantage of a loop line to fall back on in case of breakdown. The Northern Construction Company, Limited, are general contractors for the work and will finance the cost until the bonds of the power company can be sold. The Winnipeg Electric Railway Company will be the principal user of power and any surplus will be used for commercial purposes. Mr. F. H. Martin, of Niagara Falls, is in charge of the design of the plant; Mr. R. S. Lea, of Montreal, is consulting hydraulic engineer; Mr. L. J. Herdt, of New York, has also been retained.

Water Powers of Pacific Province

The report on the water-powers of British Columbia, which is about to be published by the Commission of Conservation, places the total estimated 24-hour horse-power of the water-powers of that province at about 3,000,000 horse-power, in round figures.

This report completes the series of water-power reports which the Commission in 1910 undertook to publish. The investigation of the water-powers of British Columbia, of which the present report is the result, was commenced in 1911 by the engineers of the Commission, as stated in the report.

The report contains the following estimate of the water-powers of the province, which has been divided into districts, as follows:

	24-hour horsepower
1. Columbia river and tributaries (north of the International Boundary): This comprises the portion of the province lying between its eastern boundary and the watershed of the Fraser river	610,000
2. Fraser river and tributaries: This includes practically the entire area of the great Interior plateau	740,000
3. Vancouver Island	270,000
4. Mainland Pacific coast and adjacent islands (except Vancouver islands): This includes all the rivers north of the Fraser, which drain into the Pacific	630,000
5. Mackenzie river tributaries (a rough estimate made for inclusion in this summary)	250,000
Grand Total	2,500,000

The above total includes about 250,000 horse-power for plants already in operation, but they do not include about 400,000 horsepower, given in the tables in the report for power possibilities on streams like the Fraser, Thompson, Skeena, and Naas rivers, on which, because of the proximity of railways, or possible interference with the salmon industry, economical development cannot be considered under present conditions. Also there is still considerable territory, especially in the northerly portion of the province, which it has not been possible to investigate fully. These areas may yet disclose a considerable amount of power, as stated in the report.

In round figures, the report states, the total estimated 24-hour power, including an allowance for all the entities above mentioned, may be placed at about 3,000,000 horsepower.

The Armstrong, B.C., power and light station was destroyed by fire recently.

Super-Power Plants in Great Britain*

The recent decision to proceed with the super-power station scheme for electric supply in Great Britain calls to our notice what should be done along these lines on a more modest scale in certain portions of Canada.

The British plan to improve the supply of electricity throughout Britain contemplates the replacement of the numerous small stations now in operation, by fewer but much larger stations supplying extensive districts through high tension transmission networks. There will be a gain both in economy and fuel conservation and, in many cases, the quality of service will be much improved. This national electric supply operates under the supervision of five commissioners appointed by the Board of Trade; these, in turn, appoint district boards which include representatives of electric undertakings, of large consumers and of labour.

Lancashire is to be one of the first areas dealt with, the county being divided into three districts. Some of the smaller stations will probably be shut down immediately, the energy transmitted from larger existing stations being substituted. Following the building of the new super-power plants, the Commissioners will eliminate the remaining small stations and, also, the moderate-sized plants.

A similar situation, however, does not occur in Canada, as by far the larger portion of the capacity of our hydro-electric stations is to be found in what may be called "super-power" stations; many of them are also interconnected to allow more efficient operation.

There is, however a portion of Canada where the absence of water power makes it necessary to supply power from steam or other fuel agencies. This area, which comprises southern Saskatchewan and adjacent portions of Manitoba and Alberta, is becoming of much importance through its rapid agricultural expansion and its future needs should be anticipated so far as possible. As pointed out in a report on Electric Generation and Distribution in Canada, recently published by the Commission of Conservation, adequate supply of electric energy in this section is confined to a few large centres. The smaller municipalities have installed small electric plants, which are usually very expensive to operate and only give a night service. The high rates which have consequently to be charged and the limited service prevent the full benefit which should otherwise be enjoyed from the various uses of electric energy. All these small plants through concerted action could be replaced by a few large and more efficient ones, each supplying a fairly extensive district by means of electric transmission lines. The cost of production would be reduced to about one-third and a better service supplied.

The example given in the above-mentioned report illustrates the possibilities in the Estevan district. A central power plant at Estevan would supply transmission lines radiating in various directions covering a total length of 150 miles. The estimated demand, based on the requirements of the near future, shows a total of some 600 h.p. outside of Estevan. As the lines would only carry a light load they could be built cheaply with light conductors and at a cost possibly not exceeding $2,500 per mile. If we allow a load factor of 40 per cent the cost of transmission would average 2½ cents per kw.h. The cost of production in the central plant would be from 2½ cents to 3 cents per kw.h., so that the electricity could be delivered for an average of from 5 cents to 5½ cents per kw.h. at the various small centres supplied. With a small plant, the present cost runs as high as from 15 cents to 19 cents per kw.h. Numerous other districts, if treated in the same way, would probably show advantageous results.

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*L. G. D. in "Conservation."

Routine Handling of Consumers' Accounts

Discussion on Valuable Paper by Mr. R. C. McCollum Which was Printed in Full in our July 1st Issue

Mr. Hillman (Toronto): Mr. McCollum is to be congratulated on his paper, which seems to me to cover the principal points of billing methods in an efficient way without going too greatly into details. I agree with Mr. McCollum in a good many of his statements. The day of the old-fashioned register, with 50 or more different consumers' accounts on the one page, is properly going into the discard. The continuous method of billing, which he advocates in municipalities of over 1,000 accounts, is proving by experience in the case of large concerns to be the most desired.

The point Mr. McCollum brings up in connection with the marking of the house numbers on the map is a good one, and I would elaborate that a little further by saying that houses on the street corners be definitely marked to show what the street number is. We had a case where the offices were over a store with separate entrance to both, but both bearing the same street number. We went to the proper officials in the City Hall, and he put a new number on one of the doors, and we have therefore had that building numbered to suit ourselves.

Mr. McCollum mentioned that various styles of billing forms are in use. Municipalities, in issuing bills, should always be very careful to see that the name of the municipality is on the bill. We frequently get cheques in our office with the bill attached to them, but on which no municipality's name appears. It was "Hydro," and the customer thought it must belong to us.

I want to commend the addressograph and any similar addressing system. One point Mr. McCollum might have mentioned in his paper is the fact that it serves as a check on seeing that every customer is billed. He mentioned a case where a customer might be billed or not, just as the man in the offices decided. But if an addressograph plate is made for every contract signed, that addressograph plate is used immediately to print the ledger card and the index card, and the plates are kept in separate files and the bills are handed to the addressograph clerk every day, and the cast-iron rule is made that every customer whose name is filed shall be billed.

I also agree very cordially with Mr. McCollum in his suggestion that, even though it may seem a little extra work, detailed records of cash receipts should be written up. We have a night staff that take the stubs from the teller, and the cash book is written up in accordance therewith. There is nothing so satisfying to the customer when he comes into the office as to be shown a detailed cash book and told "There is the amount of money you paid us" on a certain date. The fact that you have a definite chronological cash book enabling you to keep records in a business-like manner, will perhaps convince him he is mistaken.

I must confess I am not altogether in favor of a card ledger for very large offices. It is true that loose-leaf ledgers take up a good deal of room, but I do not see why our business is not just as important as the banking business, and it is only in the last few years that bankers would consider the loose-leaf ledger at all. They have been gradually converted to it. The card system is very easy as a matter of reference, but also very easily lost.

In his foreword Mr. McCollum has stated that the card ledger should be accessible to any number of clerks at the same time. Well, if your office staff numbers half a dozen and they all go to the card ledger together there is no reason why a card should not be lost. I am frankly in favor of loose-leaf ledgers kept in a locked binder, although we do use card ledgers in some of our subsidiary bookkeeping, as, for instance, where there are not very many accounts to be handled, and they are thus easily replaceable.

I do not altogether agree with Mr. McCollum when he (as I would put it) deprecates the necessity of a trial balance being taken from the ledger cards. We have over 100 ledgers and about 32,000 accounts, and we take a trial balance off these ledgers every month. The end of the month charges do not go into those ledgers until about the 7th or 8th of the next month, because we include the bills for the meters read on the last day of the month in that month's working. In the case of the meters read on the 31st May, it is not possible to get them out before the 5th or 6th June; so that means that ledger is not posted until the 5th or 6th June. Every one of those ledgers was balanced by the 20th June, and we carry a general controlling account in the general ledger, and subsidiary controlling accounts for each of these ledgers, so when the ledger keeper takes off a trial balance he knows right away which ledger is out of balance. I do not think a public accountant would be justified in certifying to the customers' balance in which the balances were not verified by a detailed trial balance. He should have an opportunity of seeing whether they are bad debts or recent bills. If banks require trial balances for their ledgers I do not see why we should not require the same. You can do too much checking, but at the same time a certain amount of checking should be done to see that the accounts are right. If you are going to balance up the operation ledger, the construction ledger and the appliance ledger, I do not see why you should not take out a trial balance for the customers' ledger. However, Mr. McCollum has touched upon all the main points and has certainly presented to us a really up-to-date method of handling Consumers' Accounts.

The President: Mr. Hillman, has your ledger a separate sheet for each account?

Mr. Hillman: A separate sheet for each address.

The President: In other words, it is a card system bound in a book?

Mr. Hillman: Yes.

Mr. McHenry (Walkerville): There are one or two points in connection with the various features of this system which I thought might be of interest to various utilities. One is in connection with the use of the addressograph. We have been using the addressograph in Walkerville, and up to the end of last year we found it fairly satisfactory, but we were having new plates made in Toronto and found it impossible to keep the addressograph plates in accordance with the ledger cards. I might say that our population is rather a shifting one. People are always moving from one house to the other or away to Windsor or Detroit, and consequently we have a large number of changes to make in the addressograph, and we found it paid us to buy a companion machine to the addressograph, known as the graphotype machine, and make our own plates, and I think in any utility where the population is moving rapidly and changes are continuously being made it would pay that utility to do the same thing, to make their own plates. In that way plates can be made for new customers or changes can be made the day following the application being taken in, and in that way the addressograph plates will always agree with the ledger cards.

Mr. McCollum has mentioned in connection with bills being sent through the mail, that window envelopes can be used. A few months ago I ran into something that may not have been brought to the attention of other municipalities. We use the color system for the different classes of accounts: white for residential, pink for commercial, and yellow for power, and we were using a white window envelope without transparency. The postmaster very kindly called my attention to the regulation which states that the envelope must be the same color as the bill. That is if you are using a yellow bill you must have a yellow envelope, and also the fact that no color shall be used for any bill which makes it difficult to read the address put on either by hand or by addressogroph. For instance, some colors of ribbon might give you on a blue colored bill a very faint impression or an impression rather difficult to read, and the post office in accordance with the regulations can refuse to accept any such bill. I do not know whether any of the other utilities have had this brought to their attention, but we happen to have a postmaster who, I think, spends all his nights looking up all the little by-paths in the postal regulations and seeing they are enforced.

In connection with the use of the adding machine for cash book entries, I think that is could be used by utilities very successfully. It has been used by the Walkerville commission for a year and a half, and has proved very successful. Previous to the use of the adding machine for the listing of the accounts in the cash book the cashier's full time was occupied in taking in the cash and making entries in the cash book. After the installation of the cashbook system where the addressograph was used, we found that the cashier had from two to three hours a day to spare to devote to other classes of work, and in that way we were able to get considerably more work out of that particular employee.

Mr. Hillman made the point that he is not altogether in favor of the card ledger system on account of the fact that there is a liability of cards being lost. Of course, I am not familiar with what would happen in a large system, where they have something like 52,000 accounts, and there is a possibility of cards being misplaced from time to time, but we have approximately 2,300 account cards (we are using the card ledger system) and I may say that in the last year and a half, to my knowledge, there has never been one card misplaced or lost. We make it an absolute rule that only the billing clerk or the cashier himself may take cards out of the file; any other employee must leave the cards in the file, because they can be seen and any information necessary taken from them without removing them from the file; in that way the possibility of losing ledger cards is, to a large extent, avoided.

Mr. Childs: (Hamilton) After all, it seems to me that in rendering the accounts there are only two points that must be considered—service and cost. With the system outlined by Mr. McCollum services can no doubt be given, but cost also enters into the question. He suggests giving the meter reader three-quarters of the work he got. Of course. you are losing 25 per cent. efficiency there. and I question very much whether it is advisable to lose that 25 per cent.

There is one other question in connection with that system: He says it allows for unlimited expansion. Personally, I cannot see how that works out. If you divide the city into 25 districts and you are extending almost entirely east as we are, how are you going to allow for the expansion. We are extending to-day at the rate of about 2,000 consumers a year, and we must allow for that, but that will be overcome in a short time.

It is interesting also to learn that these cards were recommended for use five years ago, in view of the fact that we have been using them for the past seven years in the same colours suggested.

Mr. Hillman also mentioned the question of losing a card. We have, as I said, been using the card system for the past seven years, and we also have a meter reading card, and if the billing card is lost it is immediately discovered by the fact that the meter card is there and no place to post the meter record to. We have now over 18,000 consumers and have lost one card.

Instead of the cash book we have a duplicate account. We don't use a stub. We have a duplicate account made out with carbon paper on the typewriter and instead of the cash book we have those duplicates bound; they are our cash book.

Mr. Hillman points to the fact that it is very nice to show a customer an entry in a book and say: "You paid so much on such and such a day. We can actually show a duplicate or the accounts on that date and say: "There is the account you paid on that date." We have a double check on everything that goes through our office. Of course, we can put through four, five or any number of checks necessary, but I think it is generally considered good practice to have a double check.

The two things to be borne in mind are service and cost. Service is first, but there must be a reasonable limit or otherwise you could say: "Why not ten checks to see that everything is absolutely correct:"; and we don't use the cash book.

I think Mr. McHenry is mistaken in regard to the post office regulation. As I read it, it is that that portion of the enclosure must be white or of a light color. We have been using white bills for residences, blue for commercial, and yellow for power.

A. E. Clark (Central Ontario System): In connection with Mr. McCollum's paper I would say we are using the very latest form of loose-leaf ledger. A town of 2,500 customers will not have more than 100 pages in a ledger. I do not think we would consider that very cumbersome, especially as loose-leaf ledgers may be made to contain any number of pages and may have any number of binders you wish.

I would like to call attention to some of the statements made in the order in which he mentions them for the purpose of showing in what way the ledger fulfils the conditions which he lays down as being fundamental.

> (1) "The record should be concise, but in sufficient detail that any error in the monthly bill can be promptly detected, or any complaint of a customer can be intelligently discussed without going back to the meter card or any other record."

The register is very concise in that it does not show any information which is not absolutely essential, but at the same time we are of the opinion that it shows all essential information, both from the viewpoint of the local office, the engineer, the bookkeeper and the auditor; the rate of consumption is shown; practically the only thing which does not appear in the register which appears in the cards is the meter reading, and personally I do not think that that is necessary in consumers' accounts, seeing that you have it in a meter reading card and do not in very many circumstances have to turn it up.

In conversation with local managers I have found that not more than 2 per cent. of our accounts have to be discussed in any one month with a customer, and therefore it should not be necessary to do a certain class of work for 98 per cent. of your customers which is not going to be of use.

> (2) It should occupy the minimum office space and in its operation be as noiseless as possible."

I do not think that such a ledger as I have described occupies any more space than a card ledger, and it is very easily handled.

> (3) It should be accessible to any number of clerks at the same time."

I do not think that the card ledger is inferior to the consumers' ledger in large offices, but I think in offices which have 3,000 or less, the register is more economical, because it takes less time to handle it, and by being subdivided into different books it is accessible in offices of such size to all the clerks who are likely to use it. In most cases it can be handled by one clerk or two at the utmost.

> (4) The index should be rapid and definite and should provide for unlimited expansion."

Since the consumers' ledger is written over every year or two, it seems to me that question is not perhaps so important, because lines can be left for vacant and unwired houses, and street numbers can be skipped in localities where building is apt to be carried on in the near future. In a great many of the smaller towns there are no street numbers and therefore the register gives a perfect index, and subject indexes, either alphabetical or such as are mentioned in Mr. McCollum's paper, can be used equally well in connection with the register.

> (5) It is especially desirable that when used in Hydro offices where a uniform system of rates is in force throughout the Province, the forms should be uniform, to secure the greatest measure of economy in installation and renewals."

In regard to the cost of forms, I do not think there is very much difference. In the case of the loose-leaf ledger the binder will last for some time, and all you need to do is supply new sheets. In our registers we have a narrow sheet for the names and a wider sheet for the financial information, various columns being provided for the different kinds of revenue. Since we started operating we have had practically no trouble in keeping the ledgers in balance.

> (6) It should be possible to examine the charges for any particular class of service without disturbing the balance of the accounts."

If there is more than one ledger it should be quite possible with the consumers' ledger as with the cards, and they have the advantage of everything being in front of the reader, who just runs his eye down the page to get all the information he wants. Supposing a town had 2,000 customers, and the manager wanted to scrutinize the accounts to get an idea of how they were being handled? Those 2,000 could be handled in the one ledger, which could easily be looked over in one hour, whereas I would think it would take nearly a whole day to look over 2,000 cards.

> (7) The records should be so kept that representatives of the Hydro-Electric Power Commission can, in the minimum time, extract from them such information as is necessary from time to time, to check the actual working out of rates and modifications of same as is required by the provisions of the Power Commission Act."

I think it is also necessary to consider that the accounts should be kept by the ledger-keeper in a manner which will keep the cost within a reasonable limit. We do not have to re-write the ledgers every year. There is a separate sheet for the names, but as soon as that sheet gets full or there are many changes in it on account of customers changing their addresses, that one sheet has to be re-written. However, at the end of two years should the register require to be re-written, by the use of the addressograph the whole of the names and addresses can be put in in one day or two days at the least. I tried this out myself in the case of one or two sheets, and I am convinced that by using the addressograph the annual re-writing of the ledger will no longer be looked forward to with any apprehension.

I think Mr. McCollum made a good point about the billing system. The recommendation which was made contained several points which made it seem that the customer's money is received ten days approximately after the bill is sent out, and in the case of the Central Ontario system that would amount to nearly $1,000 a year in interest.

In the case of those towns which have been using the continuous billing system there is no desire to go back to the old system. The Commission is putting addressographs in those offices where there are enough customers to make it worth while, and we find it nearly as expensive a proposition as the first, but the advantages are very marked. The metal plates provided are very easily changed, and if the customer moves you simply move the name from one location to the other. We have in a town of 2,300 customers found that the total cost of installation would not exceed $300. Under the old system it took three days to address the bills, whereas it can now be done in a couple of hours; so you will see the machine soon pays for itself.

Mr. McCollum did not mention the practice of billing the residential and smaller commercial customers every second month instead of once a month. We find it will be a great saving, and in some cases extra work would have been necessary if we had not done this: in other cases the work was not properly done. We do not expect to have any difficulty with this, and the local managers are enthusiastic about it. I would commend this to the consideration of the municipalities, and to any others who have not adopted it. By dividing the town into sections and billing the sections alternately the work is almost cut in two, and the bills under Hydro rates are so small now that the customer will not feel any hardship in paying two months' at one time.

Mr. McCollum did not metnion the use of post cards in billing these accounts. We purpose putting them into force in January, 1920, and we believe they will be a great saving in a considerable number of ways. The post cards are the regular stamped ones provided by the Government. There is a certain saving of office space and of time in enclosing the bill in this way. Money has been saved under this scheme amounting to $100 for bills and $675 for envelopes. The only disadvantage we see in the postcards is the possibility of defacement in transit. The other recommendation was to leave out the meter reading data.

I trust what I have said may appeal to some and lead them to believe that the register has some good points as well as the cards. I am convinced that in the small offices it is the most economical way of handling the accounts. I also think it is a good thing to show on the records the total amounts of the bills to the customers.

Mr. Yates: St. Catharines is one of the typical towns, about the same size as a large number of the larger towns and smaller cities on the system, and our smallest system is typical of that in use. We have two or three variations from Mr. McCollum's recommendations and I am glad to say that we can vary from Mr. McCollum's practice without getting into difficulty. We do not number our consumers' record cards in accordance with Mr. McCollum's system, that is, with a number for the street and a number for the district. We have the city divided into five dstricts, and one man who reads the meters. He used to be our general utility man, as some of you remember, but we have rather outgrown that now, and we find he is either getting lazy or we are getting too much business for him to do. We still continue to deliver our bills, and one man will read all our meters and take care of our bills at the same time, and if he gets behind we pick up a school boy to go out and make a few deliveries for him.

There is one thing that has not been touched upon, and that is the cash register in the cashier's office. We do not have to total up all our slips. It is a very easy thing to balance in the evening. We have our slips there, and our total on the cash register, and they are divided according to their different classes or sub-titles such as "domestic light," "power" etc., so that at the end of the day it is simply a matter of taking off the main totals and the sub-totals and checking the cash with them. In the morning the cashier takes the slips from the day before and puts them down in the cash book, and they have to agree with the different totals under the different headings of the day before. Then they are checked with the slips from the cash register and written off on the consumer's ledger card, and in that way you get a check there. Everything in our office is checked as it is so well and ably done in Hamilton, but I believe our costs are much lower than in Hamilton. Our last report shows that very conclusively. This register, I believe, is quite an advantage in relieving the cashier's office of work; also in being able to check back slips with the cash a great many mistakes can be avoided or rectified.

We hope to put in an addressograph in the near future. We have one clerk who makes all our bills, but we thought that with the addressograph it would lessen the amount of work as we expand.

One very good point in the paper is the idea of putting the name and address on the main bill, and the consumers' record number on the stub so that it only takes one impression of the cash register, instead of two to give you the address and numbered bill.

Mr. Ferguson: (Peterboro) I was very much interested in the paper read by Mr. McCollum. As far as the card system is concerned, I might state that I have been using the card system for over 18 years, and when Mr. McCollum came along and mooted the idea of putting a card system in the office I was naturally very much delighted.

The first impression one receives is that these cards will get lost or stolen. During the whole of the 18 years I have been using the card system not one card has been lost. We had to give up the card system for two or three years, and we were introduced to the large ledger system—the largest ledgers I ever saw! The only trouble we had was to get them written up. Of course, on account of having used the cards before, we were very much against the using of the ledgers, but we had to do as we were told. We have been recommended to look at the banks and see the ledgers they keep. I do not know they are are of very much use. Quite a number of bankers have found their way down to Kingston. Any system is open to fraud, but every convenience is found in the card system after you have become accustomed to its working.

Aluminium—The Electrical Metal

To both France and America belongs the credit for evolving the only practical means for producing aluminium and in both countries the production has been continually increased. The aluminium is reduced from an ore which is known as bauxite from the little town of Baux in the French Pyrenees where it was first worked. The first thing which occurs to us in connection with the reduction of an ore is simply "Smelt it." Why introduce this costly and troublesome electrical process? Well, that is just what the early experimenters thought about it. Now when an ore is smelted the oxygen combined with the metal has to be separated. This can only be done by introducing some other agent with which the oxygen can readily combine. In many instances a typical reducing agent is carbon in the shape of coal or coke. Iron ore, for instance, is loaded into a blast furnace with coal and coke and the result yields metallic iron and carbon dioxide. Now what happens if we load up a furnace with aluminium ore and attempt to do the same thing? Simply this that the aluminium will be no sooner reduced from the oxide than it forms a compound with the carbon and we are worse off than we were before. The fact is that aluminium is so ready to combine with other elements that it cannot be isolated in this way at all.

It would be tedious to go into the chemistry of the matter in detail but the only practical means found for reducing aluminium was to use an electrolytic process in which the metal would not tend to combine with the carbon of the electrodes. At the same time the temperature of the bath must be around 900 deg. C so that the electric current has not only to deposit the aluminium from the electrolyte to the bottom of the tank but has also to keep the whole mixture in a molten condition.

In actual practice the operations are more detailed than this. For one thing the ore has to be refined before it is available for the electrolytic furnace and there are different means of effecting this. In general, however, the process followed at the present day is substantially that of Heroult and Hall. Water power is, of course, essential to the production of electrical energy such large and continuous quantities as are used in aluminium production and some of the greatest water powers in Europe and America are employed in supplying an aluminium production load. It may, therefore, be called an electrical metal not only with regard to its uses but to its production.

8,000 Fold Increase in Production

While speaking of production it is interesting to compare the output of aluminium at the present time with that of only thirty years ago. In 1889, 47,000 lbs. or about one carload was produced. In 1917 the world's estimated production exceeded 382,000,000 lbs. and would require a train of 8,000 cars, a train nearly ninety miles long, to load it. Needless to say this increase of 8,000 fold in thirty years is far ahead of any other metal and proves that specific uses have been found for aluminium in which it is a strong competitor of the older metals.

To a great extent the production has been accelerated by the war; indeed the present output is much greater than in 1914. Many hundred tons of aluminium sheet have been used in the construction of aeroplane fuselage and in the structure of airships. Other applications have been for the manufacture of canteens and field utensils, binoculars and instruments, also bullet tips, shell fuses and not least as an explosive. It is interesting to note that many miles of scrap aluminium wire taken down from a transmission line near Montreal were unstranded, straightened, drawn and headed into bullet tips which were afterwards turned to good purpose. Similarly considerable quantities of scrap material were turned into powder for use as an explosive. As have already seen, aluminium oxide is very difficult to reduce to the metal; conversely aluminium in a finely divided form is oxidised very readily and in combination with an oxidising agent the action takes place with violence. It is only necessary to bring together aluminium powder with ammonium nitrate and to ignite them with a special detonator to produce explosion. The same action slightly modified is used in the well known thermit process in which this oxidation c small quantity of aluminium after being once started by a cartridge generates sufficient heat to melt the iron contained in the crucible.

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*Lecture delivered to the Electrical Club of Montreal by Ernest V Pannell, of the British Aluminium Co., Ltd.

The Manufacture of Aluminium Wire

It will be interesting to follow briefly the operations in the production of electric wire and cable in which aluminium is becoming so widely used at the present time. The metal leaves the electrolytic furnace in the shape of a block. These blocks or pigs are all analyzed and graded according to purity. In order to secure the necessary conductance a purity of well over 99 per cent must be attained and lower percentages, although they yield metal which is actually better for some kinds of work, are not passed for the wire mill. Next the metal is remelted to enable it to be cast into shape for rolling. There are many different forms of wire billets depending upon the requirements of the mill where they are to be rolled; the larger mills will, of course, take billets 5 in. square or larger whereas smaller mills will probably specify the bars to be 2 in. or 3 in. Needless to say the best material is produced by rolling down the largest possible billet which the capacity of the mill will permit.

It is usual to roll square billets rather than round because the former shape will be worked up more thoroughly and will give wire of greater tenacity. A typical wire bar into which the metal is cast is four inches square and weighs 84 lbs. This is broken down and run down hot through a great many passes the material changing its shape continually while rolling so as to be thoroughly worked. It finally emerges as a rod ⅜ in. diameter and about 650 feet long ready for drawing. Operations in the wire mill are similar to those on copper. However, the aluminium rods have the peculiarity of being free from scale and do not have to be tumbled. Furthermore it is possible to draw aluminium nearly three times as far as copper without having to anneal it. The reductions correspond to the numbers on the B&S scale and the speed depends upon the tensile qualities required in the finished product. Since aluminium is much more flexible than copper it is usual to strand up wires of larger diameter and the sizes stranded are from 10 to 16 B&S on the average. The finished wire is tested for conductance when drawn. Now the conductance of a unit cube of aluminium will vary from 58 to 62 per cent. that of standard annealed copper in the same size and is, of course, dependent on the temper of the wire. Very soft aluminium will be higher than 62 per cent. and very hard wire only about 58 per cent. It stands to reason then that there is no such thing as standard conductivity unless the tensile strength of the wire is also defined as well as the size but it is sufficient to adopt the usual figure of 60 per cent. with a tensile strength of 24,000 lbs. per sq. inch. If we are going to replace a copper wire on an overhead line with an aluminium conductor the latter will be nearly 66 per cent. larger in area and 29 per cent. greater in diameter. In other words it will be nearly two numbers lower on the B&S scale so that a No. 10 B&S copper wire would be replaced with a No. 8 aluminium.

Aluminium cables are stranded and reeled just like copper; they are naturally easier to handle during erection because of the lighter weight and greater flexibility. There is one disadvantage, however. When aluminium cables are strung on a long span tower line in the same way as copper they will be found to sag from 25 per cent. to 50 per cent. more owing to the fact that they cannot be pulled up as tightly. This factor has had little effect in climates where sleet loading does not have to be allowed for but in the northern United States and in Canada the extra sag on aluminium lines has led to the use of higher and more expensive towers. This has sometimes led to the economy effected by using aluminium instead of copper being entirely eliminated due to the extra steel.

For a long period experiments were made to determine means for the production of a conductor which would sag less than aluminium. In the first place the metal was very carefully rolled and drawn so that the tensile strength instead of being 24,000 lbs. per square inch was as high in some cases as 35,000 lbs. This, however, meant costly manufacturing operations and lower conductance. Then alloys of aluminium with copper and aluminium with nickel were tried out. These alloys yielded a tensile strength as great as copper but the conductance was very much lower than pure aluminium and a greater disadvantage was found in the deterioration which took place after exposure to the weather. Next the success which attended the use of copper-clad steel wire induced the manufacturers to experiment in the casting of a compound aluminium-steel billet and rolling and drawing down the compound wire. Unfortunately this did not work out as satisfactorily with aluminium as with copper. In the meantime, however, tests had been made on a cable consisting of aluminium strands laid around a core of steel wires. This type of conductor had a period of trial in one or two installations on the Pacific Coast for several years before it was advertised and in every way its durability was thoroughly proved. Aluminium-steel conductors are now the standard form of cable for long span high tension lines.

At first it was believed that the combination of aluminium and steel would lead to considerable trouble. It was thought that there might be corrosion between the two metals due to the ingress of moisture. However, this has not been reported. The steel wires are always double galvanized and impregnated with fish oil. Now the zinc coating on the steel works very well in contact with aluminium because it will be found from a chemical table that the two metals are very nearly the same in the positive series; in other words there will be little or no galvanic action between them even in the presence of moisture. Another objection which was urged was that with increasing temperature the aluminium would expand faster than the steel and would tend to open up the cable in birdcage fashion; this also has been found to be a mistake. As a matter of fact when properly dead-ended the two metals will expand and contract exactly the same as each other and will share the load between them so that there is no relative movement.

So the net effect is as follows: we obtain a conductor which is about thirty-five per cent. heavier than aluminium and costs four or five per cent more. But it will have a sag on long spans of fifty per cent. less; in other words the towers will be from 10 to 30 feet shorter and a corresponding quantity of steel will be saved from the line construction. The cables can be strung tightly with short crossarms and a minimum risk of swinging together.

Used for Switchboard Work

Since many thousand tons of aluminium have been used for overhead transmission it is not surprising to find that the metal has also been employed in other directions as an electrical conductor. For instance, in England there are many instances of sub-station busbars and switch connections being installed in the light metal. Here a new aspect presents itself. It is not the drop in volts which determines the size but the temperature rise. Now we have already seen that aluminium has a thirty per cent. greater diameter than the same conductance of copper; in other words, it has a thirty per cent. greater surface to radiate heat. So that the temperature rise will be lower, or alternatively for the same temperature rise a smaller conductor can be used. Following this out we find that for switchboard work one pound of aluminium goes nearly as far as two and a half pounds of copper.

A special application of aluminium may be here mentioned, that is, in the form of round rod connections for battery rooms. Sulphuric acid vapor is one of the agents which have very little detrimental effect on the metal; several battery rooms have, therefore, been connected up with aluminium throughout and give very good service. The great advantage in the use of round rod is that it can be butt welded. All that is necessary is to square up the two ends of the rod which are to be jointed and face them together in the flame of a gas torch. In a minute or two the metal will begin to soften and the ends are then firmly pressed into contact; the action squeezes out the oxide and a perfect joint with 100 per cent. conductance is the result. The same process is used with wire and many other forms of the metal but it should be remembered it is not permissible for cables to be used for overhead work because the joint in the wire will be annealed and not stand up to the same stress as the rest of the cable.

When operating voltages rose from 60,000 to 100,000 and then to 150,000 volts a trouble arose which soon began to be a serious operating problem. I allude to the phenomenon of corona discharge. In a few words it may be expressed as the breakdown of the air as an insulator and the production of a discharge from the wire, leading to a definite loss of energy. This discharge will take place at a higher or lower voltage according to certain conditions which is the size of the wire. The smaller the wire the lower will be the corona voltage. Now if the corona voltage is lower than the operating pressure there will be a loss of energy and some artifiicial means may be necessary to raise the corona voltage. This is done automatically by the use of aluminium and while there might be a considerable corona with a copper wire it will probably be found that the 30 per cent greater size of the aluminium will eliminate the corona altogether. This is generally regarded as being a matter affecting only high tension lines but it also enters into switchboard connections and insulated cables.

There are many engineers who have been accustomed to look upon aluminium as a perfectly good material for an overhead cable but who imagine that the metal cannot possibly be adopted for underground work for economic reasons. Now as a matter of fact aluminium cables have been employed for underground insulated work not only for low voltages but for transmission work running into 30,000 volts. Aluminium is found to give good results for two different reasons. In the first place on low tension cables such as are largely used in Europe for street railway feeders underground the section of metal is large and the insulation, usually paper with a lead sheat or bitumen, is not very costly. In this case it has often been found that the insulated aluminium cable, complete, is as much as 12½ per cent. cheaper than copper. Again when very high voltages are considered the larger size of the aluminium core leads to a lower potential gradient in the dielectric which is practically the corona limitation coming in again. In other words less insulation is required for this larger core and the cable is again cheaper.

It is not necessary to say very much more to demonstrate that aluminium is worth the consideration of every electrical engineer but, of course, it must be brought into comparison with copper in every specific case to show just whether it is an economic proposition. In earlier days it was objected that the supply was too uncertain to figure upon but at the present time when annual production of the white metal is 400,000,000 lbs. per year this objection has no weight.

The Interborough Rapid Transit Company, New York, has recently placed in operation at its 74th Street power house, a turbine rated at 60,000 kw. capacity continuously, and 70,000 kw. for two hours; it is, therefore, the most powerful in the world. It has three elements, one high pressure and two low pressure, and is the first triple cross-compound turbine to be placed in operation.

The new unit occupies a floor space of 52 x 50 ft., and is about 19 feet high. The high pressure element receives steam at 205 lbs. gauge pressure, and superheated 150 deg. F., and exhausts it into the low pressure elements at 15 lbs. gauge pressure. The two low pressure elements are identical in construction, and each receives one-half of the steam from the high pressure element and exhausts it into the condenser where a 29 in. vacuum is maintained. All three elements operate at 1500 r.p.m., and each drives a generator rated at 20,000 kw. continuously, 23,500 kw. for two hours, and 30,000 kw. for a half hour. The generators deliver three-phase, 25-cycle, 11,000 volt alternating current.

Bell Telephone's New Buildings

The granting of advances in telephone rates by the Railway Commission has enabled the Bell Telephone Co. to proceed with its programme of extensions. This includes a new exchange at the corner of Belanger and Boyer streets, in the north eastern section of Montreal. This office, which it is hoped will be completed by the end of the present year, is to be known as "Calumet." It is to be of the latest type of branch exchange building. Plans are also completed for the erection of a new building, to be known as "Madison" exchange, at the corner of Walkeley and Sherbrooke streets Notre Dame de Grace, Montreal. This building and equipment will be along the lines of "Calumet." Contracts have been awarded for the completion of the 10-storey telephone building—the "Plateau" exchange—at the corner of Ontario and St. Urbain streets, Montreal. It is planned eventually to house two exchanges in this building.

Plans are being prepared for new exchanges at Chatham, Welland, Pembroke, Woodstock, Shawinigan, and Brampton.

Expansion of business at London and Brantford call for an additional storey on the telephone buildings at both places. The work is to proceed at once.

Suggested Policy of the Navy League of Canada

1. To disseminate among the people of Canada a knowledge of the necessity and use of sea power as the keystone of Empire and National defence and commercial prosperity.
2. The advocacy of a policy that Canada shall assume her proper share of the cost and maintenance of protecting her own trade routes and coast defences.
3. The advocacy of a marine policy that will tend to build up our Mercantile tonnage.
4. The advocacy of the establishment of a naval reserve force composed of Canadian officers and men who have served in either the Imperial or Canadian Naval forces.
5. The support of all just claims of officers and men of the Royal Canadian Navy and its auxiliaries with regard to pay and pensions, and that merchant officers and men in times of war be put on an equal footing with regard to pay and pensions with officers and men of the Royal Canadian Navy.
6. The support of sailors' institutes in Canadian ports to better the conditions of merchant seamen when ashore.
7. The application of steady pressure upon Parliament and the Government for a better and more efficient administration of the Department of Naval Service, and the abandonment of the present system of the portfolio of Marine, Fisheries, and Naval Defence being under the Minister.
8. The application of steady pressure upon all people enjoying the Canadian franchise to see to it that our public men and Members of Parliament insist upon it that all matters pertaining to our maritime policy shall be free from political bias.
9. The encouragement and extension of Naval Colleges and of the Boys' Naval Brigade movement, and the establishment of proper training institutions, with a view to the preparation of boys and men for a seafaring career to the ultimate end that all Canadian ships shall be manned by British-born and the elimination of aliens from the Mercantile Marine.

Pulverized Coal as Fuel for Stationary Boilers

Extracts from a Paper by Mr. N. C. Harrison Before the American Society of Mechanical Engineers.

Many engineers who attempted to burn coal in pulverized form in the early days obtained unsatisfactory results, and concluded it was "impossible." In many of the earlier trials to burn pulverized coal under boilers the method adopted was to install coal-feeding devices of some kind in the furnace as it stood, with the result that the fire bricks melted down and the tubes were plastered with unconsumed carbon, ashes and soot. So destructive were the results that we can hardly blame those making the tests from arriving at the conclusion they did. How close some were to success was not fully realized. Conditions were not ripe. Today, results are being obtained that are of sufficient importance to warrant careful investigation and consideration.

For the proper combustion of coal under boilers, there are five main points which must be given serious consideration, otherwise the burning of this fuel will not be a success. These five points are:

(a) Coal fineness.
(b) Size of combustion chamber.
(c) Necessary air opening.
(d) Proper damper regulation.
(e) Clean tubes.

Coal Fineness

The pulverized coal should run about 96 per cent. through the 100-mesh screen and about 85 per cent. through the 200-mesh screen. If it runs below 80 per cent. through the 200-mesh screen, we notice particles of carbon flying through the air inside the combustion chamber, and these particles are not completely burned when the gases reach the tubes, and will then deposit themselves on the tubes. Also, these heavy particles in the pulverized-coal mixture will sometimes settle on the bottom of the combustion chamber and will soon build up in the shape of stalactites. This accumulation will continue to build until it comes in contact with the flame. These built-up particles will then fuse into a solid mass, which, in a very short time, will cause a shut down of the boiler to dig this fused mass out. It is, therefore, necessary, for the successful burning of this pulverized fuel under boilers, to have this coal as finely pulverized as possible.

Size of Combustion Chamber

Before installing, or considering the use of pulverized coal under boilers, we must first make a study of our boiler-house installation and know at exactly what rating we wish to operate these boilers, considering any peak load which may develop. We must then design our combustion chamber large enough to take care of the maximum loads which will be developed from our boilers at any time. After this maximum rating has been determined, we then figure our combustion chamber of a cubical capacity equivalent to approximately 50 cu. ft. per lb. of coal burned per min., or approximately 2½ cu. ft. per h.p. developed by boiler. If we decide to run this boiler at 150 per cent. of this rating and design our combustion chamber accordingly, the efficiency will not be decreased perceptibly if the boiler is run under this 150 per cent. rating, but if we develop over a 150 per cent. of the rating, we run into serious difficulties. We have to admit more coal and air to the boiler to develop the greater rating, consequently we need more combustion space, but not having this combustion space, the flames impinge on the brick work and cut it away very rapidly. Also, combustion is not complete at the time the gases strike the bottom row of tubes and consequently the gases will pass up the stack unburned. Efficiency is then decreased. If the gases are not completely burned by the time they reach the first row of tubes, they will not burn later on in the boiler. The size of the combustion chamber should also be so designed that the velocity of the gases should not pass through this combustion chamber at a speed of more than 6 ft. per sec. The mixture of air and coal entering the combustion chamber, as stated above, should be at as low a pressure as is possible to bring this mixture in in suspension; or, in other words, breathe it in.

Proper Air Openings

The pressure at which the pulverized coal is admitted to the furnace is as low a pressure as can be used to carry this fine coal in suspension, and is, I should say, about half an ounce pressure at the nozzle. In some installations the coal falls by gravity from the variable-speed screw conveyor, located on the bottom of the pulverized coal bin, into a fan air line which carries it into the furnace and also supplies the necessary air for combustion. Some few openings are placed in the front wall of the boiler to give any additional air which may be needed, and a few may also be placed on the side walls of the boiler to protect the brickwork at times.

In other installations the amount of air necessary to convey the coal into the furnace varies, according to the rate at which the boiler is being operated. The balance of the air to burn the coal properly is admitted through adjustable air openings in the front, sides and bottom of the combustion chamber. These openings are made adjustable and are placed on all sides of the combustion chamber to take care of the various grades of coal which may be used in the boiler plant. By properly observing the combustion in this chamber, by a little experience the fireman knows at exactly what points to give more, or less air needed for combustion.

Damper Regulation

In order to give the proper velocities of gases passing through the combustion chamber, it is necessary that we have very accurate damper regulation to take care of the various load conditions which the boiler is to supply. The damper should be so regulated that we should practically have a balanced draft inside of the combustion chamber and only a slight vacuum in the first pass, while at the damper itself we do not want more than 0.10 to 0.15 in. If we have more vacuum than this, it pulls our gases through the combustion chamber too fast, causing them to be unburned before reaching the first row of tubes and will then build up very fast on the outside of these tubes. This very small draft needed at the base of the stack will allow us to operate boilers using pulverized coal with stacks of about 30 to 35 ft. in height.

Clean Tubes

In order to get the maximum evaporation from any boiler it is necessary that the tubes be kept clean, both inside and outside. The keeping of the tubes clean inside is a question of the proper quality of water and has nothing to do with pulverized coal. The keeping clean of the outside of the tubes is very necessary with the use of pulverized coal as a fuel ,and they should be blown by means of mechanical soot blowers at least every six hours, and oftener if it is necessary. Also, once every 24 hours by means of a hand-lance steam jet we should blow the bottom of the first row of tubes. These are the tubes in which the gases come into contact first after leaving the combustion chamber. This material can be blown off easily if the combustion chamber has been properly constructed and if they are blown regularly as needed. But if they are not blown regularly this material builds up and accumulates very fast and in time will become fused and cannot be blown off.

Removal of Ash

Another item which might have been included in the five main points above, and might have been called the sixth point, is the removal of ash which deposits at the bottom of the combustion chamber. As spoken of above, this ash should be removed at regular intervals, which intervals will be determined by the amount of ash in the original coal. If we do not remove this ash regularly, it will build up until it comes in contact with the flame, when it becomes fused and has to be dug out. But if removed at regular intervals, it can be easily raked out with the ordinary boiler-room ash rake and will not consume more than half an hour per 24 hours, and will not interfere with the operation of the boiler while this is being done.

The following are some advantages of pulverized coal as a fuel for boilers over stokers:

usable is obtained when burning coal in pulverized form.

(a) Much wider variation in the quality of the coal Practically any and all grades of coal can be burned in this form with economy. No stoker will satisfactorily handle all grades of coal. Therefore the use of pulverized coal will largely overcome most trouble due to poor coal, and it is particularly desirable for this reason alone.

(b) The ability to take care of peak loads almost instantaneously. In other words, a pulverized-coal burning system is much more flexible than a stoker installation. Its flexibility approaches that of oil or natural gas.

(c) The amount of coal that can be burned per sq. ft. of grate surface on stokers is limited so that for increased capacity the boiler setting must be spread out to cover more area. When using pulverized coal this condition does not exist, for proper furnace conditions can be obtained by increasing the height of the boiler setting or the depth of the combustion chamber.

(d) By throwing a switch the entire firing operation ceases; an advantage in case of accident or emergency.

(e) Ash is in much better condition to handle. The ash is in the form of a dust or slag depending upon its melting point. This helps to maintain constant furnace temperature as there are no interruptions to firing conditions on account of cleaning fires.

(f) Since there are no grates used when the fuel is burned in pulverized form, we experience no clinkering of grates, as in the case of stokers, particularly after operating at maximum rating.

(g) Pulverized coal is fired dry, containing less than 1 per cent. of free moisture, whereas coal burned on stokers may vary anywhere from 1 to 10 per cent., of free moisture as fired.

(h) Considerable less excess air is necessary for complete combustion. This item is of the utmost importance when making comparisons. Less excess air means less power for furnishing air supply particularly where forced draft is used. With less excess air the stack losses are less. Lower grades of coal fired on stokers require more excess air as it is quite difficult for the oxygen to get in close contact with the combustible. An air supply sufficient to furnish all the aid for combustion should be available, although at times only 50 per cent. of the air is necessary to be injected into the furnace with the coal, the balance being supplied by the induction action of the burner or drawn in by the stack draft through the various adjustable openings in front and sides of combustion chamber. The air going into the furnace should be under control to permit close regulation under all conditions of firing. Less draft is required for pulverized-coal-fired furnaces.

(i) All the combustible in the coal is consumed when it is burned in pulverized form, providing the furnace capacity is not exceeded. None of the combustible goes out into the ash pile and therefore fires are eliminated in the ash pile.

(j) There is less erosion from sulphur on the boiler due to less moisture in the coal as fired, therefore high-sulphur coals can be burned more readily and without serious results.

(k) With furnace properly proportioned and with properly designed burning equipment smokeless operation may be maintained indefinitely. This is due to complete combustion of all the particles of coal before coming in contact with the cold surface of the tubes of the boiler.

Points to Keep in Mind

The following few points must be kept in mind for the successful burning of pulverized coal under boilers:

(a) A boiler using pulverized coal should have as few burners as is possible consistent with good regulation. The burners must be proportioned for the maximum rating of the boilers, and they must be adjustable. Simplicity of design is desirable. It has been found much more desirable to introduce coal into the furnace as far away from the side walls as possible so that the rapid continuous expansion of the gases will not develop high velocities in close contact with the furnace refractories. Furnaces under boilers should be proportioned so that the velocity of the gases should not be excessive, particularly at the smallest cross-sectional area of the furnace. Vertical baffles should replace all horizontal baffles.

(b) A boiler of any size can be fired successfully with pulverized coal. Various designs and makes of boilers can be readily arranged for pulverized-coal firing, but those containing the smaller percentage of space for the lodgment of ash are preferable.

(c) Feeders for regulating the flow of pulverized coal to the furnace must be designed so that at all times the variation in quantity will be directly proportional to the speed of the screw and no flooding allowed. The speed of the feeder should be so regulated that operating at its maximum r.p.m. the supply of pulverized coal to the furnace will not exceed the capacity of the furnace. Soot blowers should be installed in settings where pulverized coal is used.

(d) The equipment for using pulverized coal is standard for any grade of coal so far as handling, preparing and delivering to the furnace is concerned. Only a slight change is necessary in the furnace to take care of coals of very low volatile content, such as anthracite, culm and coke breeze, and increased drying capacity is desirable when lignite coal is used. With stokers this is not the case as the varying quality of coals require different type stokers to obtain highest efficiency.

(e) The labor required to operate a pulverized-coal installation may be of higher class but the number of men required will be less in the larger installations than that required for a stoker installation, thereby affecting a saving in the labor charge in favor of pulverized coal.

An Actual Test

The following is a report of a test made on a 468-h.p. boiler using pulverized coal as fuel. This installation is noteworthy not only by reason of the high efficiency obtained, but also because of the fact that it has made clear some of the conditions necessary for the successful operation of boilers utilizing powdered fuel.

When the boiler was first put into operation, a number of undesirable conditions resulted. An insufficient air supply caused high-furnace temperatures resulting in fusion of the ash particles and a consequent accumulation of slag between the tubes, on the furnace walls and in the ashpit. The removal of the molten slag presented considerable difficulty. It was also found that the combustion chamber was of insufficient size. High gas velocities resulting from insufficient air in the chamber tended toward destruction of the refractory surfaces of the furnace.

A new furnace was, therefore, designed. The combustion chamber was enlarged and a regulated air supply was provided for by means of a number of auxiliary air openings equipped with dampers. The accumulation of slag in the pit was prevented by raising the point of admission of the fuel into the furnace. As a result the flame path has been raised above the base of the pit, hence particles of ash dropping from the flame are not fused. The ash, therefore, can be drawn from the pit in the form of a powder and small slugs of slag. Analysis has shown that the ash contains practically no carbon.

Having established satisfactory furnace-operating conditions, a series of efficiency and capacity tests were conducted preliminary to proving the contract guarantees. The brickwork was then given a thorough trial by carrying the boiler at a continuous rating of 180 per cent. over a period of several days. On August 12 and 13 a final efficiency test, the results of which are given below, was run. The boiler is a three-pass water-tube boiler, equipped with a superheater.

Log of Test of a Pulverized-Fuel-Burning Stationary Boiler.
Date August 12-13, 1918.

Make of boiler	Edge Moor
Rated h.p.	468
Heating surface, sq. ft.	4685
Time fired or test started	11.15 a.m. 8/12/18
Time fire out or test finished	11.15 a.m. 8/13/18
Duration of test	24 hr.

	Maximum	Minimum	Average
Temperature of boiler room (deg. fahr.)	99	85	93.3
Temperature of feedwater	168	135	157.2
Temperature of steam (deg. fahr.)	477	427	448.7
Barometer in. of mercury	29.35	29.20	29.25
Temperature of flue gases (deg. fahr.)	515	455	495.3
Average boiler pressure, lb.			167.0
Atmospheric pressure, lb.			14.4
Temperature of steam, deg. fahr.			373.8
Superheat, deg. fahr.			74.9
Safety valve set for, lb.			175
Fuel fired per hr., lb.			1,990.6
Total fuel, lb.			47,775
Total water, lb.			393,168
Water apparently evaporated per hr., lb.			16,393.0
Water apparently evaporated per lb. of coal, lb.			8.23
Factor of evaporation			1.1502
Water evaporated from and at 212 deg. fahr. per lb. of coal, lb.			9.47

	Maximum	Minimum	Average
Carbon dioxide (CO_2) per cent.	15.4	12.2	13.85
Oxygen (O) per cent.	5.6	3.2	4.38
Carbon monoxide (CO)			None
Fuel used			Bituminous screenings

Fuel Analysis	No. 1	No. 2	No. 3	Average
Amount of coal represented by each sample, lb.	19,775	20,000	8,000	....
Per cent. of total	41.3	41.1	16.9	....
Moisture (per cent.)	10.3	11.0	9.7	10.49
Volatile (per cent.)	33.81	36.96	38.77	35.96
Fixed carbon (per cent.)	50.43	49.13	48.29	49.53
Ash (per cent.)	14.36	13.91	12.94	13.93
Sulphur (per cent.)	1.90	2.06	2.12	2.04
B.t.u. as received	10,600	10,763	11,263	10,779
B.t.u. dry	11,817	12,093	12,473	12,045
Vacuum in burner, in.				0.000
Vacuum under primary arch, in.				0.000
Vacuum in combustion chamber, in.				0.000
Vacuum in first pass, in.				0.000
Vacuum in second pass, in.				0.0057
Vacuum in breeching, in.				0.09
Feeder speed, r.p.m.				(No. 1), 53.6; (No. 2); 50.7
Coal per rev. of screw, lb.				0.318
Accumulation of slag on tubes				None
Flues blown during test				5 times
Operation of furnace				Very satisfactory
Pulsation				None
Condition of smoke				Light
Heat effect on brick				None
Back lash of flame in burner				None
Pounds of steam per hr. from and at 212 deg. fahr.				18,842.6
Horsepower				546.2
Per cent. of rating				116.7
Boiler efficiency, per cent.				85.22
Memoranda—Fuel-preparation deduction:*				
Coal used in drier, lb.				1,140
Motor operation				449.3 kw.-hr.
Coal equivalent at 3 lb. per kw.-hr., lb.				1,348
Total deduction, lb.				2,488
Resulting net efficiency, per cent.				81.1

*No deduction made for stand-by losses in drier.

Pulverized Coal vs. Mechanical Stokers

At this same plant are other boilers fired by one of the most efficient types of underfeed stokers. A comparison is made below between results of above test and tests made on the stoker-fired boilers. Fuel-preparation costs will first be considered. In the case of powdered coal this can be classed under three general divisions:

(a) The cost of crushing the coal. This expense is the same for pulverized-coal equipment as for stokers.

(b) The cost of drying and pulverizing the coal. Although no cost records are available at present, it is estimated that 32 cents per ton will cover this preparation cost on a 200-ton-per-24-hr. plant using bituminous coal containing about 12 per cent. moisture.

(c) The maintenance costs of the drying and pulverizing plant. This unit has not been determined from actual experience; however, it is estimated that 3 cents per ton will cover the maintenance. In stoker practice the maintenance cost per ton of fuel fired is close to 5 cents per ton.

Summarizing the above facts it is evident that, with fuel at $5 per ton, the gross efficiency shown by the pulverized-fuel boilers will have to exceed that shown by the mechanical-stoker-fired boilers by 6 per cent. in order to offset coal-preparation costs. A 6 per cent. deduction from a gross efficiency of 85.22 per cent. results in a net efficiency of 79.22 per cent. for the powdered-coal burner. In stoker practice the maximum attainable gross efficiency at any of our plants has been 80.54 per cent. Deducting the 2.5 per cent. for auxiliary uses, the resulting net efficiency is 78.04 per cent., which is lower by 1.18 per cent. than the figure obtained in pulverized-fuel practice.

Other advantages resulting from the use of pulverized fuel are summarized herewith:

(a) Continuous boiler operation at a uniform rating as well as a constant efficiency is made possible. At no time is there a loss in capacity due to the clinkering of coal on the grates or the cleaning of fires, as is the case in stoker practice.

(b) Heavy overloads can be taken on or dropped off in a very brief time through adjustment of the coal feeders and the furnace drafts.

(c) From 97 to 98 per cent. of the combustible in the coal is utilized, regardless of the quality of the fuel.

(d) The ash-handling costs are reduced to a minimum due to the reduced volume.

(e) The banking conditions when operating with pulverized coal are somewhat different from those obtained in stoker practice. By stopping the fuel supply and closing up all dampers and auxiliary air inlets a boiler can be held up to pressure for about 10 hours. The furnace brick work having been heated to incandescence during operation gives off a radiant heat which is absorbed by the boiler rather than being sent out through the stack. The case of controlling the fuel, feed and drafts, the ability to take on heavy overloads in a brief time, the thorough combustion of the coal and the uniform high efficiency obtainable under normal operating make pulverized coal a most satisfactory form of fuel for central station uses.

The full story of maintenance expense is only partly known as yet, however. Indications are that no unusual difficulties will be met. The cost of fuel preparation and labor for operating a boiler room fully equipped with pulverized-coal-burning boiler will be a question for the engineer to decide for himself according to his particular conditions. If properly installed with respect to capacity of storage, size of drier and pulverizers, and on a sufficient number of boilers to properly and fully employ the minimum number of men, the pulverized-fuel installation will undoubtedly be more advantageous. The main item that must be borne in mind by engineers is that the ease with which a high efficiency is obtained and the constant nature of that efficiency, as compared to the lack of constancy of efficiency in a stoker-fired boiler, unless very closely supervised, is the one factor about the burning of pulverized fuel which justifies its use. There is no doubt that with a well-equipped plant burning pulverized fuel, having all the necessary recording and indicating instruments to guide the operators in maintaining the proper conditions, a lower cost of generating steam will be possible than has heretofore been the case in any type of equipment.

Sherbrooke's Street Railway on Service at Cost Basis

The Sherbrooke, P.Q., Council have passed a by-law amending the agreement with the Sherbrooke Railway & Power Co. The by-law provides for an arrangement by which the city will do certain paving work, the cost to be reimbursed by the company. The fares are to be as follows: From 6 a.m. to 12 p.m. 8 cents, or four tickets for 25c; from 12 p.m. to 6 a.m., 15c cash; children under 14 years, 4c cash or 8 tickets for 25c. These fares are to remain for 12 months, and are to be subject to revision every 12 months at the request of either the city or company, the Quebec Public Utilities Commission to decide in case of disagreement. The company is free from the cost of snow removal for a period of five years. The company agrees to extend the system at once, and to double track a portion of its lines. The linesmen of the city of Sherbrooke electrical department went out on strike for higher wages; this has been settled, the men now receiving from 35c to 40c an hour, with time and a half for night work.

Electric Arc Welding

The Westinghouse Company has just recently issued an elaborate publication covering the process of electric arc welding and the necessary apparatus required for this process. This publication compares the different processes of welding, such as autogenous welding, forge welding, oxy-acetylene welding, thermit welding, and outlines the advantages of electric arc welding over these as follows: 1, economy; 2, ease and convenience of application; 3, speed of operation; 4. reliability of results; 5, reclaiming defective material 6, safety; 7, conservation of material; 8, less skilled labor required. The field for electric arc welding is unlimited and the process has made enormous strides during the last few years until now it is widely used throughout those branches of the metal industry in which work is done on iron or steel in rolled, cast or fabricated forms.

The Maine and New Brunswick Electrical Power Co. have let the contracts for an additional unit at their development at Tinker Station, N.B. This will make the fourth unit. The Foundation Co., Montreal, will enlarge the dam and power house, and construct a tunnel and new steel penstock. The water wheel will be of 2400 h.p., 400 r.p.m., complete with Lombard governor, working under a head of 72 feet, and will be supplied by the Canadian Ingersoll Rand Co., Ltd., Sherbrooke and Montreal. It will be direct connected to a 1500 kv.a. generator, to be supplied by the Canadian General Electric Co.

David A. Starr Made World Reputation as Manager of Clyde Valley Electrical Company

We regret to report the sudden death on June 23rd of Mr. David A. Starr, general manager of the Clyde Valley Electrical Power Company, Glasgow, at the age of 61. He had been in failing health for the past eighteen months, but had recently returned to business after four months spent in the United States, Cuba and Jamaica. Mr. Starr, who was well known in electrical engineering circles in Great Britain, as well as in Canada and the United States, was born in Halifax, N.S., and, after serving his apprenticeship there joined the civil engineering staff of the Canadian Pacific Railway Co. Subsequently he turned his attention to electricity, and joined the staff of the Thomson-Houston company at their Lynn works in the States, returning later to Montreal as sales manager to the Royal Electric Company. His subsequent Canadian experience covered electric tramways and light railways.

In 1901 the British Westinghouse Electric & Manufacturing Company, Ltd., secured his services for their Trafford Park works, Manchester, and in 1903 he was appointed general manager of the Clyde Valley Electrical Power Company. The erection of the company's power stations, and the laying down of their large plant and comprehensive system of mains, were carried out under his supervision, and the present development of the power supply business in the west of Scotland, together with the position of his company as one of the largest in the kingdom, must be attributed to a large extent to his unflagging zeal and energy, and to his sound views on the future of the industry. Mr. Starr was a past-president of the Scottish Section of the Institution of Electrical Engineers, and was closely associated with the work of the Association of Electric Power Companies.

The late Mr. David A. Starr

Mr. Starr, who was a son of the late Mr. John Starr, Halifax, Nova Scotia, is survived by a widow, three daughters, and one son. Mrs. Starr was Miss Ella Brown, daughter of Mr. Alexander Brown, Prince Edward Island, and the two elder daughters are Mrs. J. C. Manson and Mrs. H. G. Good. The only son, Alexander, is, since demobilization from the army, associated with his uncle in the business of John Starr, Son & Company, Halifax, N.S.

The Contractor-Dealer

Channels of Distribution Between the Manufacturer and Consumer—Contractor-Dealer a Dominant Feature If, and When, His Sales Policy Becomes Aggressive

By Mr. Samuel A. Chase

The channels of distribution in the electrical industry are indefinitely marked with trade beacons of (1) trade organizations, (2) proper trade differentials, (3) proper codes of practice and ethics, supported by absolute knowledge of what each of these beacons means to the captains of our industry. It reminds me of the mariner who endeavors to pilot his ship through a river which was not clearly marked with beacons of safety.

In considering this subject three important factors should properly enter into the discussion, viz.:

(1) Economic distribution.
(2) Effective distribution.
(3) Adequate distribution.

The product of this cargo to be distributed from the manufacturer to the consumer is made up principally of merchandising or resale electrical appliances and supplies and does not include, in its bills of lading, lighting or power apparatus.

The various channels of distribution in the past from the manufactuer to the consumer may be divided into the following groups:

By the manufacturer direct.
By the jobber—wholesaler.
By the Manufacturer's Agent.
By the Central Station.
By the Hardware Merchant.
By the Dry Goods Store.
By the Drug Store, and in some instances by various other merchants not strictly in the electrical supply business.
By the Contractor-Dealer.

The Manufacturer

The manufacturer has frequently made the mistake in the past of being allured by the temptation to obtain the middleman's profit, and has taken small orders direct from the consumer, at an apparent profit, but has learned by costly experience that this so-called profit is wiped out by the cost of obtaining and handling the orders. The result is not only a net loss in money, but a disturbed and unhealthy condition in the trade, but it has, in some instances, taken years of experience to teach some manufacturers the wisdom of a policy of selling his merchandising product to the consumer through the middlemen, recognizing the service rendered by the jobber and the contractor-dealer.

The manufacturer has, in some instances, chosen the direct route to consumers in the past due to the uneconomic, ineffective and inadequate distribution through other channels and a hesitancy on the part of the middleman to create a sufficient demand for the goods manufactured and although a definite sales policy has been adopted by some manufacturers of selling direct and through the middlemen at the same prices, their direct sales exceed all others by a large percentage, notwithstanding the local influence of the middleman and the cargo close at hand.

I will venture to state that the average manufacturer will welcome the day when it will be possible to economically and efficiently distribute his merchandising product exclusively through the electrical jobber and retailer (central station and contractor-dealer) but these channels are not yet deep or broad enough or sufficienly safe and efficient to warrant any manufacturer with a large sales organization in the field to sell exclusively through the jobber and retailer.

The Jobber—Wholesaler

The jobber or wholesaler has done in the past, and in some instances, at the present time, still does a retail business in addition to a wholesale business, and sells to other jobbers, to central stations, to contractor-dealers and to consumers—and, in some instances, I regret to state, sells to consumers without recognizing, in the form of a differential, the service rendered by the contractor-dealer; in other words, sells to the consumer at the dealer's price, which practice is not only unethical, but demoralizes the contractor-dealer business to such an extent that it makes that class in the industry seemingly distrustful and quite naturally has a tendency to prevent his engaging in the retail business, hence retarding sales and expansion.

The jobber of the past has been somewhat like many manufacturer's agents, and has shipped an order calling for a miscellaneous lot of goods from the four winds of the earth direct from the various manufacturers to the contractor-dealer or consumer because of not carrying a sufficient stock in his warehouse.

Cross arms from the State of Washington.
Pins and brackets from North or South Carolina.
Pole line hardware from Illinois and Pennsylvania.
Bare and insulated wires from Massachusettes or New Jersey.
Wiring devices from Connecticut or New York State.
Bell wiring appliances from Pennsylvania or New England, causing delayed and expensive shipments. But the jobber of to-day assembles all these goods in his own warehouse and distributes for the manufacturer complete, in one shipment, frequently the same day the order is received, which is of great advantage to the contractor-dealer. Therefore the jobber can be the natural, economic and efficient channel of distribution from the manufacturer to the contractor-dealer.

The Manufacturers's Agent

The manufacturer's agent's policies vary. Some carry a small stock and ship and invoice customers, while others carry no stock and are simply order takers for the manufacturer; some sell indiscriminately to jobbers, contractor-dealers, and consumers, and should, in reality, be classed as salesmen for the manufacturer, who has no sales organization in the field.

Central Stations

Central stations have been pioneers in the sale of and distribution of incandescent lamps, and that channel was marked with beacons of free renewals and cut prices, alluring the industry not to a haven of safety, but to a rock-bound coast of disaster. Now, the channel has changed to the jobber, contractor-dealer and central station, with the percentage clearly marked with beacons of ethical merchandising and intensive selling, producing absolute fairness in competition between the competing groups—and the contractor-dealer with a well-located, attractive retail store now plays an important part in the channel of distribution of lamps from the manufacturer to the consumer.

The flat iron, washing machine and vacuum cleaner and other household appliances were introduced principally by the central station who did the pioneer work on these appliances as well as on incandescent lamps, and it is my belief that the central station, on account of its organization, prestige, financial responsibility and desire to add kilowatts to its lines, will always be the logical pioneer and pilot the way for the jobber and contractor-dealer on household, current consuming devices, and it would be very unfortunate to the manufacturer and to the consumer if the central station should go out of the retail business, properly conducted on an ethical basis. Most central stations will always carry the introductory or development expense of placing new current consuming devices on the market. It is, therefore, up to the contractor-dealer to co-operate and take full advantage of the demand created.

Mr. Samuel A. Chase

Other Merchants

The hardware, dry goods, drug store, and other kindred merchants have probably done more to advertise electrical merchandizing products than other distributors, but I do not always approve of the character of their advertising, because, like the central station advertising, its principal story is "cut-prices." With recognized business ability, however, attractive stores and display windows and unquestionable financial standing the call of the siren has been so alluring that it has wrecked many a manufacturer's ship in the channel of distribution to the consumer.

Each of these groups, however, create and obtain a certain amount of business which ordinarily could not be obtained by strictly electrical concerns principally because these merchants make it easy for the housewife to obtain electrical appliances for the reason that their stores are attractive, located in the shopping district frequented by ladies and in charge of efficient sales organization, and they will continue to increase their electrical departments and sales and will attract the manufacturer as one of the efficient and economic channels of distribution to the consumer, unless the contractor-dealer becomes alive to the situation and the necessities of the public and parallels the methods of these merchants.

The beneficial results, through a plan of scientific merchandising, practical trade co-operation and organization advocated by Mr. Goodwin, about which you are all familiar, so ably supported by the electrical press, manufacturers, jobbers and central stations will unquestionably result in making the specialized electrical retailer, whether he be central station, jobber, or contractor-dealer, the dominating channel of distribution from the manufacturer to the ultimate consumer.

The Contractor-Dealer

The contractor-dealer has not, until recently, become a merchant, and I don't know as I can blame him, for the reason that apparently all classes in the industry have looked upon him as a necessary evil, rather than an economic necessity. All other classes in the industry have been cultivated to a high degree, but the contractor-dealer, until recently, has been allowed to drift, unaided, uncultivated, and looked upon as a parasite, superflous in the channel of distribution and, rudderless, without a beacon light to guide him, has been wrecked on the rocks of commerce.

The contractor-dealer, because of these facts, and realizing there was no stability to the prices of merchandizing appliances or wiring devices, has not taken advantage of the opportunity presented and opened a sufficient number of attractive retail stores and the channel of distribution from the manufacturer to the consumer via the electrical dealer route has made it difficult rather than easy for the housewife to purchase electrical appliances.

Manufacturers and jobbers alike have sunk the contractor-dealer ship in the past through unethical and other unbusinesslike methods, frequently rendering it impossible for the dealer to distribute to the consumer at a profit, and the goods purchased from the manufacturer for the purpose of distributing to the consumer remain on the shelves, slow moving, and often become obsolete because of these unethical methods.

Channels of distribution change like rivers and we cannot force distribution from the manufacturer to the consumer through uneconomic channels because, like rivers, such a distribution will back up and create a new channel. Some rivers don't change their channels, but the channels of navigation sometimes change and so does the channel of distribution. However, just as the channels of navigation in a river change from time to time, due to natural elements, farming sandbars, sand pits and other elements dangerous to navigation, which may be changed by design through medium of engineering talent and modern machinery by the application of the dredger, tide walls and jetties, so may the channels of distribution of electrical merchandise be changed by the application of scientific merchandising methods directed by the best thought and activity of the contractor-dealer.

I am firmly convinced that by an aggressive sales policy by the contractor-dealer in co-operation with the jobber, by maintaining high class specialty shops, active interest in his association and by the most friendly relations with the manufacturer, central station, consulting engineer, builder and architect, the channel of distribution of the contractor-dealer will gradually become wider and deeper until he will become a dominant factor in the percentage of materials distributed through his channel and will be a powerful factor in the future in molding the policy of the manufacturer towards a definite decision to recognize the contractor-dealer to a greater extent in the future as the most economic and effective distributor of re-sale products.

The Open Meeting

The "open meeting" of the contractor-dealer is a necessity and is commanding the respect of manufacturers, jobbers and central stations, and through the knowledge these groups obtain of the problems of the contractor-dealer, to this extent will they be able to lend co-operation, thereby causing to flow an increasing percentage of merchandise through the channel of the contractor-dealer.

The trade, like the flow of a river, seeks the channel of least resistance—the better business man the contractor-dealer develops to be, the more prominent the location of his store, the character of his store, the support he gives to his trade associations, the manner in which he conducts his trade association, the character of officers of his association, the conduct and manner of presentation of his trade problems through committees when dealing with the manufacturer or jobber, all tend toward removing barriers and resistance and aid in directing the flow of trade through the contractor-dealer channel.

Now, the manufacturer is faced with the choice between certain channels for the distribution of his product—in one channel he has the palatial department store, well managed, with unquestionable credit standing—then he has the central station and the jobber, and against this he has the contractor-dealer, who, in the past, has not always appealed to him in a favorable light as compared to the other channels just mentioned, but with the methods they are now employing, with attractive retail stores, located conveniently for the buying public, intensive sales methods, improvement in organization, proper presentation of problems through able committeemen, preventing forcible rather than arbitrary arguments to attempt to force the flow of trade, the contractor-dealer is every day commanding a higher respect from manufacturer, jobber and central station, and is causing them all to think and to think hard, which must result, if they continue along these constructive lines, in causing an increasing percentage in business flowing from the manufacturer through the jobber-contractor-dealer channel.

In conclusion I would suggest that the channel of distribution in which the contractor-dealer navigates be labeled:—

Organization,
Co-operation,
Ethical Merchandising Policies.
Determination,

and with these slogans properly applied there can be but one answer, and that is the contractor-dealer ship will be the flag ship and lead the squadron through the channel of distribution from the manufacturer and jobber to the consumer.

Big July Meeting of Hamilton District Electrical Association

The Hamilton District Electrical Association held a meeting at the Royal Connaught Hotel on Wednesday, July 9. A large number of members were present. Mr. K. A. McIntyre addressed the members regarding the National Association of Electrical Contractors and Dealers' Convention to be held at Milwaukee July 14-18. At the conclusion of Mr. McIntyre's remarks the Association appointed Mr. L. H. Lander, Mr. J. A. Dynes and Mr. V. K. Stalford as delegates to this convention. The Open Price Plan was discussed at great length; it is expected, through the discussion held, that greater use will be made of this plan in the future, all the members present signifying their intention to submit all tenders issued by them to the secretary of the Open Price Plan.

Mr. Frank T. Groome has resigned his position as sales manager of the Benjamin Electric Manufacturing Company of Canada

Lamps—The Sugar of the Electrical Business

Lamps are to the electrical trade what sugar is to the grocer. They are a staple—a necessity. Quite naturally anyone with any kind of an electrical retail business wants to handle lanmps. Also certain groups in the trade think at times that they should be named the retail lamp distributers for local territory to the exclusion of other groups which also want to handle lamps. And so we have what is coming to be known as the lamp situation. Lamp distribution presents, therefore, a problem which the industry must solve. No single group in the industry working alone can solve it. Everyone will have to pull together to make it a real solution—a solution which will insure the public maximum lamp service and the industry maximum economy.

In the interests of this getting-together it might be well, therefore, to review the thoughts of the leaders of the various groups. Everyone ought to know what the others are thinking and a fair exchange of views ought to help untangle some of the present muddle. But first let us name the groups that have an interest in lamps. They are: The contractor-dealer, the central station, the non-electrical merchant handling lamps, the electrical jobber and the lamp manufacturer. All must be considered in addition to the public.

The Contractor-Dealer

The contractor-dealer's point of view is somewhat unique in that he, in most instances, until recently had very little point of view to speak of. He has not been, in the past, a real merchant. Now he has come to the conclusion that he wants to be a merchant. He feels very strongly on this point and it is his intention to show some folks who have maligned him in the past that he can conduct himself as a legitimate and successful merchandiser. He recognizes, however, the very great difficulty of conducting a retail business without handling any staple line. He recognizes that one very desirable staple line from the standpoint of profit and steady volume is lamps. He feels that he is very close to the public and that this will help him sell lamps. He feels that his contact with users of electric service in the capacity of adviser on home electrical needs and seller of electrical equipment gives him a hold on people that he should be permitted to utilize in selling lamps. He feels that the central station's main job is to sell electric service and that the central station can cede him the lamp business in return for the very material help he can be to the central station in assisting it to maintain amicable public relations. The dealer, therefore, very generally blames the jobber for the participation of the hardware and the drug man in the present scheme of lamp distribution. In some cases he even thinks the manufacturer should aid him financially in his local advertising, in order to assist in his distribution of lamps. In isolated cases the contractor-dealer is at present doing some rather wild thinking, but almost everywhere he is making his claim that he wants to be the retail merchandiser of lamps and he wants that very badly. So much for the contractor-dealer.

Traditions of Central Station Selling

Now the average central station man incorporates considerable tradition in his thinking on the lamp question. There was a time when the central station had a very real need for controlling lamp distribution among its customers. The manufacture of lamps at that time was not an exact proposition, it being impossible to produce within close limits lamps capable of being operated at a specific voltage. This situation absolutely does not exist at present, owing to the introduction of the tungsten lamp which can be manufactured to operate within very close limits. During the early period the central station of necessity acquired control of the lamp distribution, and in many cases it still holds the reins. That it has not released its hold appears to be largely a matter of local conditions. There has been some feeling also that control should be retained until it was certain that some other able agency was really ready to handle lamp sales.

The central station man knows that he has less need to control the lamp situation now. What he does want and has a perfect right to want and get, is a full and satisfactory assurance that all sockets on his lines will be filled. This would certainly not be the case if lamp distribution were left to any hit or miss scheme.

The Non-Electrical Lamp Distributer

One of the most interesting characters in this lamp situation is the non-electrical merchant who in some way has begun to handle lamps. The hardware merchant is easily typical of this class. Possibly he handles his lamps in connection with his cutlery department. He no doubt started out with a $300 contract which gave him a profit of only 17 to 20 per cent., perhaps less than his overhead. He took it on, however, to give it a trial. He made a feature of selling cartons of lamps instead of the one or two which the customers asked for. He soon worked the lamp business up into a real retail trade. He probably has reached a point now where he is on a $5,000 contract and is making a profit which he considers satisfactory, in spite of the fact that his overhead is probably more than 23 per cent., or that which the average electrical dealer assumes he has. This hardware man thinks the lamp business is a good business. He is of the opinion that if all other lines which he carries were as "clean" as lamps and carried the same profit, he would be mighty happy. He firmly believes that any electrical merchant who cannot take the same line and make money on the same scale of discounts which he has been offered is either no merchant or is trying to hog all the profits. He is not particularly interested in the difficulties of the electrical industry. All he wants is to be let alone so that he can continue to sell lamps.

Another non-electrical dealer in lamps, which in some localities should be considered, is the drug store. But upon a close analysis of the class of lamps handled by the drug stores and the class of lamp business done by them it seems only fair to say that the drug store lamp business is very generally a cut-price proposition. Moreover, the volume, comparatively speaking, is not large.

The Jobber's Viewpoint

Another interested party is the jobber. The electrical jobber's problem has been to get lamp distributers who would distribute. He believed he could not afford to be too choicy. He had to go out and find dealers who could sell lamps and who would sell them. In some places he has been forced to take on non-electrical dealers because of the lack of merchandising ability in the local electrical trade. In some cases he has been a trifle "grabby" in the matter of industrial plant business, but perhaps on the whole he has been as much sinned against by incompetence within the electrical trade as he has been sinning for the extra margin against the electrical trade.

The Manufacturer

Last but not least in this string of interested lamp people is the manufacturer. He quite naturally feels that he has a duty, not only to his stockholders, but to the public. He wants to make money and good lamps, and to make it easy for the public to buy lamps, and for his distributers to make money. He is not particularly concerned about who handles lamps as long as they do a good job of it, except that as a matter of sentiment he would probably like to see the money stay in the electrical family. He can certainly be expected, however, to favor the dealer who proves to him as a manufacturer that he knows how to get the lamps over the counter into the hands of the public and into the sockets of the homes.

While these various branches of the industry each continue to hold their beliefs, men in other industries who know anything about the lamp situation look on in amazement and continue to wonder how we get away with it. And that, indeed, is the great wonder—how the electrical industry has managed to grow and thrive as it has, maintaining the while a system of commercial distribution that looks like a Chinese puzzle.

Solution is "Good Merchandising"

The signs of the times are encouraging, however, for it appears that something orderly will grow out of the activity of the contractor-dealer. In the days to come he will probably be a greater and greater factor in lamp distribution, but it is not to be believed that he will ever get the lamp business handed to him on a silver platter. If he wants it he will have to go out and get it. He will have to build it up. He will have to learn how to use the telephone to find out whether Mrs. Smith has empty sockets at home, and to convince her that in the interests of economy and convenience, she should fill them. He will have to learn how to use the manufacturer's literature to assist in creating a demand for lamps. He will have to learn how to write letters that will make the customer see the danger of falling down the basement stairs if he doesn't put a lamp in that cellar socket. He will have to learn how to quit kicking and how to get to work. When he does that, he will know he is the real merchant, and then the lamp situation will have been solved.

Toronto Contractors' Monthly Meeting

The Toronto Electrical Contractors held their regular monthly meeting on Thursday evening, July 3rd, Mr. Kenneth A. McIntyre, president, in the chair. The members motored out along the Toronto-Hamilton highway to the new wayside inn, near Oakville, called the Alvertonia, where they had dinner together and a good lively business meeting afterwards. Over forty members were in attendance. Mr. Stalford and Mr. Reid also motored over from Hamilton and took part in the discussions.

One of the most important matters discussed was that of the absorption of young returned soldiers as electrical apprentices. Under the Dominion government's scheme for the re-establishment of these men in some trade, a fixed sum is set aside which is paid to the men during their probationary period when, presumably, their lack of experience would make it impossible that they should earn a living wage. It appears that this condition is being exploited by certain employers who have made application for large numbers of these apprentices, simply because they do not have to pay them wages. To prevent this and also to keep a regulating hand on the number of apprentices employed, having in mind the quantity that can be properly absorbed, the Toronto electrical contractors have drawn up a recommendation to the Government covering the whole situation. This recommendation was discussed at the meeting and its wording finally determined.

The question of the proper rate to charge the customer for labor was also discussed. The practically unanimous decision was that an advance of 50 per cent. over the standard wage paid the men was correct.

The Open Price Plan was reported as operating in Hamilton, where the members are gradually coming in. Toronto contractors discussed the operation of the system in Toronto and a number of members who had not yet sent in copies of their tenders definitely committed themselves to do so in future. The point was raised by Mr. Roxborough that architects to whom he had spoken seemed suspicious of the Open Price Plan and rather of the opinion that it was an arrangement to boost prices. Mr. McIntyre was authorized to get in touch with the local chapter of the Architects' Association and clear the matter up so that this erroneous impression may be permanently removed.

How I Increased My Sales 100 Per Cent.

By a Successful Retailer

It's a wonder the manufacturer and jobber in electrical supplies don't take a more personal interest in the retailer and his methods. Isn't it plain that if the retailing end is weak, the demand for goods from the manufacturer and jobber is just so much less and their profits are correspondingly low. Somebody most assuredly has got to come to the aid of the unskilled retailer—show him how to be a merchant or years will go by without any appreciable improvement in the situation.

Now, the obstacles that stand between the contractor-dealer and success are twofold. First, he doesn't know how to merchandise and, second, he hasn't the necessary capital. This latter applies, at least, to a very large number for we retailers are now coming to realize that we can't carry on a successful selling campaign on good intentions alone. We need a first-class location, a fairly comprehensive stock and, finally, money enough to come and go on to make it possible to sell on the installment plan.

Speaking personally, I have had wonderful results since I started to sell appliances on the monthly payment basis and am convinced that this is the right course for any dealer to pursue. We have got to get electrical appliances into the homes of many a man who has not the ready money to pay for them spot cash—so we dealers must carry him along for a while. Of course, he pays a little more for the article so that we get interest on our money. I have specialized on ten payments, though that seems to be longer than the average, but six payments for a washing machine, say, calls for fairly big monthly installments. Besides, ten is an easy number to calculate with and your customer is not led into a maze of figures which take his mind off the main object—the appliance.

A few years ago the idea of buying anything on the installment plan was much less in favor than it is today. How many Victory Bonds would the Dominion Government have sold, however, if they had demanded cash payments. Come to think of it, how many of the commercial enterprises which form the basis of our industrial activity and stability could continue to carry-on if the banks withdrew their support The whole fabric of our commercial life is woven with "credit" and we need not fear that we are advocating a policy that is fundamentally unsound when we offer to sell appliances on an installment basis.

I now sell any appliance, of whatever, value, in this way with 5 per cent. off for cash, though very few of my customers take the cash option. My sales have not only doubled but I believe I can trace to this new policy an increase to four times my turnover of a year ago.

Montreal Armature Works

The officers of the Montreal Armature Works, Ltd., electrical engineers and contractors, Montreal, are all technical men. Mr. S. D. Sweetnam, B.Sc., the president and managing-director, is a graduate in electrical engineering of Finsbury Technical College, London, England, and McGill University, Montreal. After graduating from McGill he joined the test department of Allis-Chalmers Bullock, and was later erecting engineer for the company. He started in business in 1914, in the firm of Giddings & Sweetnam, which was dissolved in 1917, after which he established the Eastern Electric Co.; this was continued until May 1st of this year, when the Montreal Armature Works, Ltd., was formed.

Mr. N. C. Mills, C.E., E.E., A.I.E.E., the vice-president, is a graduate of Harvard University in civil and electrical enginering. After graduating, Mr. Mills was engaged on survey work in Newfoundland & Labrador, afterwards joining the General Electric Company of Schenectady. For several years he was chief induction motor designer for the Canadian General Electric Co., Peterborough. When the United States entered the war he volunteered for service and was assigned to the engineering officers' training corps and was afterwards discharged on account of his health.

Mr. P. J. Dolan, director and shop superintendent, obtained his theoretical training at the Manchester School of Technology. He served a four-years' apprenticeship at the shops of the Industrial Enginering Co., Hyde, Cheshire, Eng., and afterwards worked in the winding departments of the British Westinghouse; General Electric Co., of Witton; Bruce, Peebles & Co.; Vickers, Ltd.; and the repair shops of the London Electric Railways and White Jacoby, London. After coming to Canada Mr. Dolan worked four years in the winding department of the Canadian General Electric Co., Peterborough, and for three years was the electrical superintendent of the Wayagamack Pulp & Paper Co., Three Rivers. He joined the Royal Air Force, Mechanical Section, in 1917, and on his discharge this year joined the Eastern Electric Co.

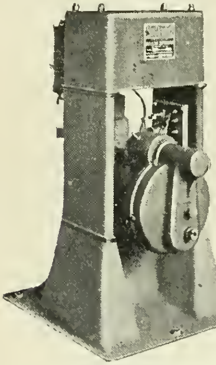
Circular on Electrical Precipitation

A circular describing the Westinghouse achievements in the field of electrical precipitation has just been issued. The process applies to copper, lead or zinc smelters, blast furnaces, chemical, acid and cement plants for the recovery of valuable material otherwise wasted. Water can be precipitated from oil, dust removed from ventilating systems, etc. It is also applicable to operations such as round houses which by their smoke or fumes are a nuisance to the surrounding territory. The necessary apparatus for the precipitation process such as motor-generators, transformers, rectifiers, motors, switchboard and accessories are shown installed, and are described in detail in this circular. While there are several mechanical and chemical methods for collecting or suppressing dust in furnace and kiln operation, they are in general limited in application by conditions of temperature, acid, and similar qualities of the product to be handled. Electrical precipitation has few limitations of this sort and is generally applicable for collecting suspended solid and liquid particles of every description, whether acid, alkaline, or from gases of widely varying temperature.

Bear in mind that in Canada, as in the United States, you have not reached 5 per cent. of your potential market. You still have 95 per cent. of the road to go—a road of commercialism, popularization, intensive selling.—W. L. Goodwin

Uni-Lectric Lighting Plant

The illustration herewith represents the Uni-Lectric lighting outfit, for which the Masco Company, Limited, are distributors in the province of Ontario. This equipment embodies features that hitherto have not been found in many electric lighting plants. It is built in one capacity, 1,000 watts, for 110 volts, and is of both the hand starting and the electric starting type. In the hand starting type the engine is cranked in the same manner as an automobile, but in the electric starting type there is provided a standard automobile type of starting equipment, including a 6 volt battery, starting motor and Bendix drive. A solenoid switch actuated from the 6 volt storage battery by pressing an ordinary push button, which may be located at a convenient point or points, throws the starting motor across the storage battery and cranks the outfit. Releasing the presure on the push button immediately opens the switch when the unit is started. A second push button may be installed to short circuit the magneto and stop the equipment. These push buttons are usually arranged on a 3-wire system with a common return, and on account of the low voltage may be wired the same way as bells or annunciators. In this way as many starting and stopping stations may be installed as the customer desires, it being only necessary to carry the three wires from each station.



Masco Co., Toronto, are agents for this farm lighting outfit

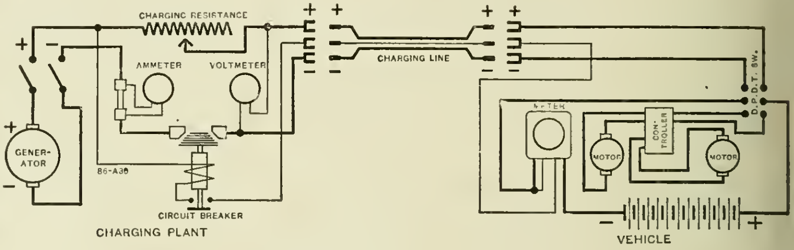
The engine on these equipments is a single cylinder rotating sleeve valve type. It is equipped with a high tension magneto and a solenoid control butterfly valve so that the voltage is automatically regulated and it is unnecessary to discharge through storage batteries in order that the voltage regulation may be obtained. The absence of storage batteries simplifies the equipment and there is no loss of energy through the charging of such battery. In addition to this feature the 110 volt generator increases the range of service and decreases the cost of wiring. It is also possible to use standard code wiring throughout and the ordinary heating appliances, small motors, ets., as sold for central station service, may be used on the equipment. The highest grade of materials has been used and the outfit has been so designed as to present a most compact and presentable unit. It is also possible to readily gain access to any part of the equipment for examination.

Factory tests have shown, under 200 watt load, nine hours run per gallon of gasoline; under 500 watt load, 5½ hours run per gallon, but this is largely dependent on the grade of gasoline. The gasoline consumption increases very slightly with increase of load from ½ load up to full load.

Locomotive Type Ampere Hour Meter

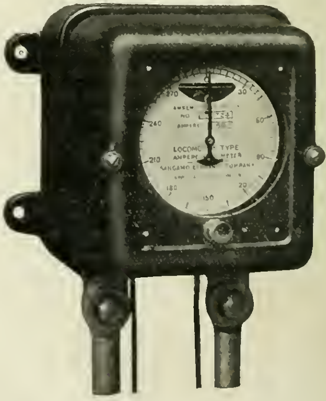
The experience of the past few years in the operation of storage battery trucks, tractors and battery mine locomotives has clearly demonstrated that the chief problem in the operation of these devices is the problem of the storage battery. Accordingly, the ampere-hour meter, which is the only device that automatically gives a true indication of the state of charge of the storage battery at all times and automatically terminates the charge at the proper time, is of special importance in this connection. A new locomotive type ampere-hour meter has just been designed by the Sangamo Electric Company in order to meet the severe requirements as to overload and vibration experienced in this particular service.

The ampere-hour meter when installed permanently in the storage battery circuit on the track, tractor or locomotive, registers every ampere-hour which the battery discharges in driving the vehicle, and since the total battery capacity is indicated by the red "Empty" hand on the meter, the black hand indicates the remaining capacity left in the battery. The operator then knows at all times how much farther he can run the truck. When the battery is later put on charge the ampere-hour meter registers as the charge proceeds, operating in a direction reverse from that of discharge. When battery has been fully charged the meter will register zero and make contact within the meter which trips circuit breaker in the charging circuit.



Wiring diagram of ampere-hour meter

No battery is 100 per cent. efficient. More charge must be given than was taken out on the previous discharge, so there must be a certain amount of excess charge each time the battery is charged. This feature is automatically provided for in this meter by means of a variable resistor device which causes the meter to run slower by any desired percentage on charge than on discharge for equal current flow. This automatically



Sangamo ampere-hour meter

provides that the battery will be given any desired percentage of overcharge, for, by the time the meter indicating hand gets back to the full charge position, all of the previous discharge plus a certain percentage overcharge (depending upon the setting of the variable resistor element) will have been been put back into the storage battery. This feature is entirely automatic, and once the resistor has been set at the desired percentage of overcharge, no further attention need be given the device.

This locomotive type meter which has been especially designed to meet the severe requirements of mine locomotive and industrial truck service embodies several distinct improvements over previous Sangamo ampere-hour meters.

1. Overload capacity increased.—Locomotive type meter will carry 300 per cent. load continuously and 500 per cent. load for 3 minute periods without undue heating of any parts.

2. Meter made dust and moisture proof by means of improving binding posts, terminals and soft rubber gasket in case.

3. New type contact at zero.— This is mounted entirely back of the dial and operates on cam principle instead of lever as formerly, thereby reducing drag on meter and increasing reliability of the action of the contact.

4. Modified motor element.—Special treatment is given to both the armature disc and armature box interior which has reduced the formation of mercury dross to about ¼ of that formerly experienced. This will probably improve the meter operation very greatly and eliminate trouble due to meters being slow on account of dross.

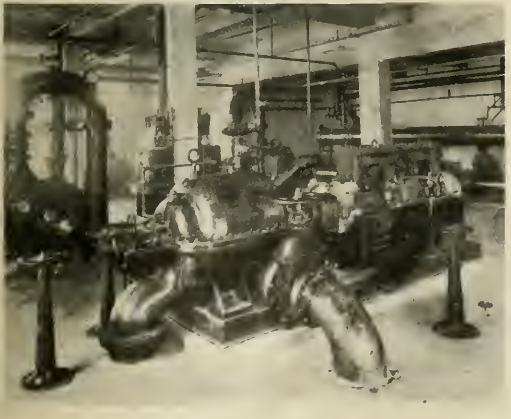
5. New type variable resistor element which is approximately eight times as effective as the resistor element formerly used. This insures greater reliability of operation and increases the range of adjustment so as to provide a maximum of 50 per cent. overcharge where desired.

6. Reset made dust proof.

7. Lock washers throughout and special rugged construction combined with mercury flotation of the rotating element, make the locomotive type meter immune from vibration and loads.

Standby for Pumping Plants

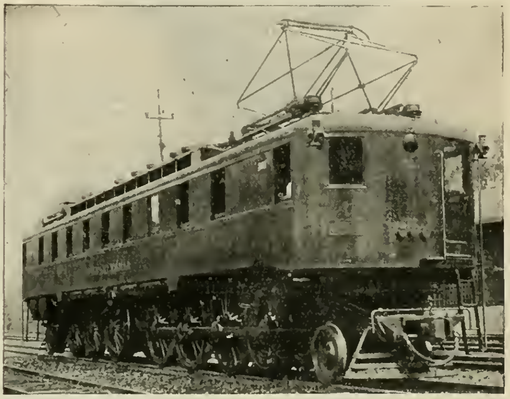
The illustration herewith shows the installation recently made at St. Johns, P.Q., to the designs and specifications of Ouimet & Lasage, civil engineers, Montreal, for a standby auxiliary in the pump house. The prime mover is a "Sterling" 200 h.p. gasoline engine driving a Kingsford 2-stage 3,000,000 gal. capacity turbine pump, suction 12 in., discharge 10 inches, total head, 235 feet. The units are direct connected and have a speed of 1,400 revolutions per minute. The engine was supplied by the Pyke Motor and Yacht Company of Montreal. The pump was supplied and installed by the New York Jewell Filtration Company, New Birks Building, Montreal. The "Sterling" engine is finding a wide field in Canada for stand-by purposes, the insurance companies' regulations demanding, in many cases, that an auxiliary supply of power must be available in case of failure in the electric service.



Gasoline-engine driven pump at St. Johns, P.Q.

Moving Tonnage in Large Units

The ability to increase track capacity for the rapid expedition of heavy freight trains is fast becoming a difficult problem, owing to the tremendous increase in train tonnages to be moved as a unit. In other words, the problem before many steam railroad operators is how to increase the physical capacity of a certain heavy tonnage division without prohibitive expense. At the same time, after such an expenditure in correcting alignment, grade reductions and other operating difficulties, there still remains the problem of operation, namely hauling without delay the tonnage offered for transit. The introduction of the large 250-ton locomotive of the Pennsylvania Railroad recently exhibited at the Master Mechanics' and Master Car Builders' Convention held at Atlantic City, is an advance in the possibility of moving heavy tonnage in large units over steep grades. Here we have maximum accelerating horsepower of 7,600, with a sustained horsepower capacity of 4,800 for one hour. With two of these engines a 6,300-ton train can be handled up long grades at constant speed; as, for instance, on a 25-mile 1 per cent. grade, such a train could be moved at 20.6 miles per hour. Thus there exists equipment for hauling traffic in larger units and with the rapid movement of such large quantities of freight the division rapidly becomes cleared, ready to handle additional tonnage. This locomotive was designed under the general direction of Mr. J. T. Wallis, general superintendent of motive power, Pennsylvania Railroad, together with Mr. B. G. Lamme, chief engineer Westinghouse Electric & Manufacturing Co.



250-ton locomotive

> The great problem of the electrical industry of the future is the commercial problem.—W. L. Goodwin.

Commercial Lighting Units

Scores of business men are to-day becoming more than ever interested in better lighting as a means of increasing efficiency, and there is a good field in this direction for dealers who are interested in going after the business. The large majority of stores, offices, schools, churches, assembly halls, display rooms, and so on, all have old-time lighting fixtures—principally because they have not been shown the advantages of the new, modern lighting units. The illustration herewith shows the "Clearlite," No. 2609, manufactured by the Tallman Brass & Metal Company, Hamilton, Ont. This fixture is scientifically constructed and comes in several styles. It is particularly suitable for commercial lighting of all kinds.

"Clearlite" No. 2600

New Publications

"We Welcome Fair Competition," is the title of a circular just issued by the Portable Machinery Co., Passaic, N.J., manufacturers of the Scoop Conveyor. It briefly describes how one concern has copied and is trying to market an imitation of the Scoop Conveyor. As there is suit now pending for infringement of rights, the circular warns possible customers of portable conveyors against purchasing the imitation.

Mr. Strickland in Brantford

Mr. H. F. Strickland, chief electrical inspector for the Hydro-Electric Power Commission of Ontario, was in Brantford recently looking over that inspection district. While there he attended a meeting of the Telephone City Electrical Club and a good many points in connection with the rules and regulations, which were not clearly understood, were discussed and expained. His visit will tend toward better relations between the inspector and the contractors. Mr. Strickland's idea of periodical visits to each district under his supervision is a good one, and is bound to be productive of splendid results to the electrical business and will greatly assist the contractor as well as the inspection department.

The Marchand Electrical Co.

Mr. P. E. Marchand, electrical engineer and contractor, for the past twenty-one years senior member of the firm of Marchand and Donnelly, of Ottawa, is severing his connection with Mr. W. L. Donnelly on August 1st, and going into business with his sons, under the name of Marchand Electrical Co. They will carry on the business of electrical engineering, contracting and commission agents.

Personal

Lieut.-Col. John Wise, D.S.O., M.C., who recently returned from overseas, was, at the outbreak of war, a motorman in Halifax. He enlisted as a private.

Mr. V. K. Stalford, former District Electrical Inspector Hamilton District Office of the Electrical Inspection Department of the Hydro-Electric Power Commission of Ontario, has resigned, and will open an office in Hamilton as a consulting engineer. Mr. Stalford is very well and favorably known in the industry, and his friends, who are legion, will wish him every success in his new venture.

Mr. R. J. Hillier, a well-known figure in the electrical industry, has been appointed manager of the electrical department of the International Machinery and Supply Company, Limited, 371 St. James Street, Montreal. Mr. Hillier was formerly a very active figure in the Canadian Electrical Association. He started in with the old Royal Electric Company in 1887, following which experience he spent some years with the Canadian General Electric Company and with John Forman. Later he transferred his activities to the Engineering Equipment and Supply Company. Mr. Hillier is widely and favorably known and his thoroughly intimate knowledge of the jobbing trade will be a fine asset to the company with whom he is now associated.

Mr. Thomas F. Kelly, formerly with the Dominion Power & Transmission Company of Hamilton, but since February 1, 1913, with the Dayton Power & Light Company, has returned to Canadian soil as Canadian Sales Manager of the Hoover Suction Sweeper Company. The Canadian headquarters of the Hoover Company, until recently at Windsor, is being moved to Hamilton, where they are building a new plant, and where Mr. Kelly will have his office. Sweepers will be manufactured for distribution in Canada and probably throughout the British Empire. Judging by the regret expressed by Mr Kelly's friends in Dayton, he was a great success there, just as he had been with the Dominion Power & Transmission Company. We trust that success will stay with him in his new position and that the sales of the company he represents will continue to increase under his guiding hand.

Mr. Thomas F. Kelly

Volume 1 of the eleventh annual report of the Hydro-electric Power Commission of Ontario, has just been printed. This is for the fiscal year ending October 31st, 1918, and contains information in connection with (1) Legal Proceedings; (2) Transmission Systems:; (3) Operation of the Systems; (4) Construction Work of the Commission and (5) General Activities of the Commission.

PHILLIPS'

ARMOURED CABLES

No. 2 B. & S. 3-Conductor 25,000 Volt Cable

Paper Insulated, Lead-covered, Double Steel Tape Armoured

Supplied to the Order of
The Quebec Railway, Light, Heat and Power Company

Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary, Vancouver

Current News and Notes

Brantford, Ont.

The Eletcric Tin Products Company, recently granted a Dominion charter, will erect a plant in Brantford, Ont.

Chatham, Ont.

The Chatham, Wallaceburg and Lake Erie Railway have completed arrangements to operate with Hydro power and the change-over will be made within the next few weeks.

Erieau, Ont.

The ratepayers of Erieau, Ont., have circulated a petition to have the Hydro line extended from Blenheim, Ont. The power could be used to advantage in operating the large coal docks, as well as by a number of summer residents.

Guelph, Ont.

An agreement has been prepared and will shortly be voted on by ratepayers authorizing the Grand River Railway Company taking over the control and management of the Guelph Radial Railway Company. A number of changes are contemplated, including track repairs, new one-man cars and more rapid service.

Halifax, N.S.

The Board of Public Utilities has made an order authorizing an issue of $1,000,000 seven per cent. gold notes of the Nova Scotia Tramways Company, the funds to be used for track renewals, additional cars, equipment for power stations and extensions to lines. Much of the work will be carried out this year.

Hamilton, Ont.

Messrs. Hunter and Strome, formerly with Snyder Bros., electrical contractors, fixtures and supplies, King William Street, Hamilton, have recently purchased the business of Ernest Wark, electrical contractor-dealer, 167 King Street East, Hamilton.

Hastings, Ont.

The Hydro-electric Power Commission of Ontario, it is stated, will proceed with the erection of the 44,000 volt transmission line from Healey Falls to Peterboro this season, which will make it possible for Havelock, Norwood and Hastings to have Hydro service.

Kenogami, Que.

It is reported that a power plant will be constructed on the Shipshaw River, Kenogami, Quebec, by Price Brothers Company, Ltd. The estimated power available is 15,000 h.p.

Montreal, Que.

Earnings of the Southern Canada Power Company for June, 1919, were $48,961, an increase of $9,012 over the same month last year. Operating expenses were $25,551, an increase of $2,801.

A. A. Giddings & Co., Montreal, have been awarded the contract for the electrical fixtures and lamps for the Hunter Building, Ottawa. These are of special design.

The strike of Montreal wiremen has petered out. Three or four firms with rush orders conceded the union rates, one or two others made compromises, the majority have obtained all the labor they want on the old terms, and many strikers are now out of jobs.

The Montreal Light, Heat & Power Consolidated, has reduced the price of electric light. The rate is 6c per kw.h., and the discount has been increased from 16-2/3 per cent. to 20 per cent. This makes the net 4.80c per kw.h., which becomes operative in October. At the same time the directors increased the dividend rate to 5 per cent.

Mr. William T. Scott, for over thirty years connected with the Bell Telephone Co., Montreal, died on July 10 at Napanee, Ont. Mr. Scott, who retired in 1913, for many years held the position of special agent for the company in Montreal.

St. Boniface, Man.

An automatic telephone system is being installed in St. Boniface, Man., where there are about 900 lines.

St. John, N. B.

The New Brunswick Power Co., St. John, recently offered a place on the directorate to a member of the union of the company's employees. The latter have decided not to accept the offer for the present.

St. Thomas, Ont.

T. W. Lester, St. Thomas, Ont., has changed his store name from The Electric Supply Company to Lester Electric.

Toronto, Ont.

The Electric Materials and Products Company have been granted an Ontario charter. The capital stock is $50,000; head office, Toronto.

Members of the Toronto City Council recently inspected the Chippawa development at Niagara Falls.

Winnipeg, Man.

The route being followed for the transmission line from Winnipeg to Portage la Prairie, Man., by the provincial government, is approximately 59 miles in length and will cost about $215,000. Power will be delivered from the Scotland Avenue sub-station of the Winnipeg power plant at 12,000 volts; stepped up to 66,000 volts for transmission and stepdep down to 22,000 at Portage la Prairie. A further expenditure of about $60,000 will be entailed by the construction of the sub-station and equipment at Portage la Prairie and changes to the Winnipeg sub-station.

Mr. Geo. K. McDougall, Drummond Building, Montreal, announces he has taken into partnership Major E. Raymond Pease, D.S.O. The name of the new firm will be McDougall & Pease, consulting engineers, specializing in industrial applications of electricity, illuminating engineering, electric power stations, high voltage power transmission etc.

The Armstrong Cork and Insulation Company, Pittsburgh, Pa., are distributing two valuable little folders entitled, "Nonpareil Corkboard Insulation for Cold Storage Rooms and Freezing Tanks" and "Saving 63% of the Drinking Water Expense." Supplied on request to the company.

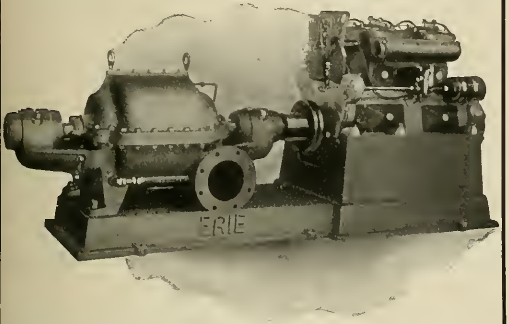
The British Aluminium Co. are distributing a little booklet, entitled "The Casting of Aluminium," including a quantity of information, under the following headings: Alloys; Mixing Alloys; Moulding; Melting. It may be obtained upon application to the Company at 265 Adelaide Street West, Toronto.

The Ward-Leonard Company have issued an interesting little folder entitled "The 15 Year Club," showing photographs of employees who have been with that company for 15 years.

The Wagner Electric Manufacturing Company, of Saint Louis, announces the removal of its Philadelphia office, service station and warehouse to 1632-34 Sansom Street

Sterling Emergency POWER

Instantaneous, efficient, dependable, for centrifugal pump and electric generator drives. 10 to 300 Horse Power, 2, 4, 6 and 8 cylinder gasoline engines, 200 to 1400 R.P.M.



Sterling Model FS, 4 cylinder engine, 100 H.P. at 1400 R.P.M. direct connected to Erie Pump Co.'s 3-stage type M.S. centrifugal fire pump for U. S. Navy.

Write for catalog

STERLING ENGINE COMPANY
Department C 7
BUFFALO, N.Y.

Motors for Sale Subject to prior sale, we are offering the following Motors for Sale

1—Packard Electric Co. Motor, 30 H.P., 3 phase, 60 cycle, 550 volt, 900 R.P.M., complete with pulley and starting box. Serial number 257.
1—Canadian Crocker-Wheeler Co. Motor, 10 H.P., 3 phase, 60 cycle, 220 volt, 900 R.P.M., size 116-Q, complete with pulley and starting box. Serial number 7309.
1—Wagner Electric Co. Motor, Type B. P., Model 14-V, 10 H.P., 3 phase, 60 cycles, 220 volts, 1720 R.P.M. Complete with pulley and starting box. Serial number 104529.
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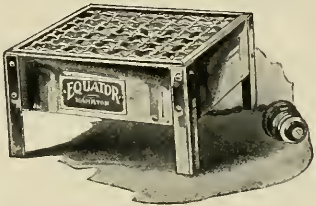

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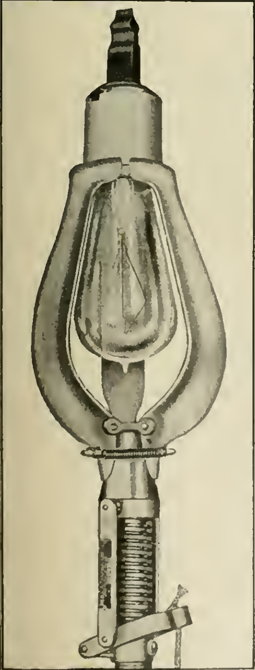

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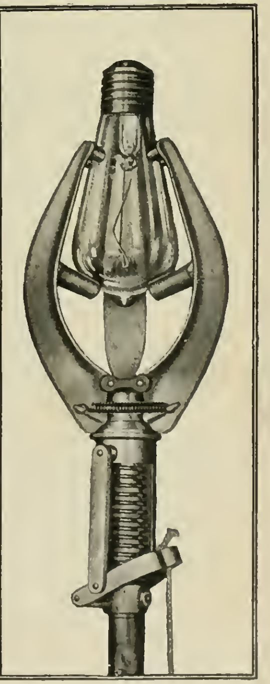

Condensed Department

Publisher's Notice

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

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Wanted to purchase in quantity 2 H.P., 3 H.P. and 5 H.P. Motors, 550 Volts, 3 Phase, 60 Cycles. Write Box 983, Electrical News, Toronto. 14-15

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14. A fair price to permit good work.

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1	75	3	25	550	725	Westg.
2	52	3	25	550	720	Lancashire
1	50	3	25	550	720	Westg.
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
1	30	2	60	220	720	F.-M.
1	25	3	25	550	1440	J. & M.
1	25	3	25	550	720	Lancashire
1	25	2	60	220	945	Westg.
1	20	3	25	550	1440	J. & M.
2	15	3	25	550	1400	Lancashire
3	15	3	25	550	730	Westg.
1	15	3	25	550	710	Chap. & W
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	J. & M.
1	7½	3	25	550	1500	Lang-Dav.
1	7½	3	25	550	725	Westg.
1	7½	3	25	550	750	C. G. E.
2	5	3	25	550	1440	Excelsior
1	5	3	25	550	750	C. G. E.
4	4	3	25	550	1400	Excelsior
1	3	3	25	550	1500	C. G. E.
2	3	3	25	550	1400	Excelsior
1	1	1	60	220	1750	Wagner
1	1/6	1	60	110	3400	Diehl

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H. W. PETRIE, Limited
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There may be certain articles which you cannot find in these advertising pages that you would like to have information on. Do not hesitate to use this form, no matter what it is. If we can be of any service to you in supplying that information, it will be a pleasure to do so. We want you to feel that the Electrical News is published in your interests, and we want to help you whenever we can.

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Electrical News
Generation, Transmission and Application of Electricity

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Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

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Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

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Vol. 28 Toronto, August 15, 1919 No. 16

Ontario Power Company's Plant Reaches Ultimate Development

This issue contains a detailed description of the latest and final addition to the Ontario Power Company's plant at Niagara Falls, now owned and operated by the Hydro-electric Power Commission of Ontario. It consists of an installation of two units of 15,000 kv.a. each and necessitated the installation of a third pipe line. Such an expense would scarcely have been justifiable in view of the more economical development now proceeding at Queenston, had the requirements of war industries not reduced the supply of power available to a figure considerably less than the demand. However, as a piece of engineering work, it is none the less interesting because it may prove a more or less temporary necessity. As the demand for power increases the Hydro Commission will probably find it necessary to utilize the water that now passes through the Ontario Power Company's turbines, at the more economical plant now building at Queenston, where the head is more than twice as great. In the meantime, this plant is one of the most up-to-date and efficient on the continent.

Every phase of labor and organization required by the exigencies of modern warfare are shown in the Canadian War Memorials paintings to be exhibited at the Canadian National Exhibition this year.

Among others, the "Hell of Death" that faced the Canadians at the second battle of Ypres, when they were set against the first German gas attack, is vividly portrayed

City of Guelph Accepts Its Moral Obligation to Support Hydro-Radials

The city of Guelph very decidedly defeated the by-law to sell its local electric railway system to a private corporation. The Grand River Railway Company not only offered a fair value for the system, but also promised extensions. The city decided, however, that it would be serving its best interests to stand by Sir Adam Beck and Hydro-radials, and Sir Adam has given his promise that work on these radials shall proceed without further delay.

The vote does not necessarily mean that Guelph was dissatisfied with the offer of the private company, but rather, no doubt, that they were determined to stand by the other municipalities that had committed themselves to the municipal hydro radial scheme. The only possible way to make the Beck scheme a success is for everybody to stand back of it. A single defection can cause untold trouble. In voting as they did Guelph was unquestionably following the honorable course. If all the municipalities speak in the same decided way it should also prove the wisest course.

Prince of Wales as a Soldier

Many charming little stories, demonstrating his great human and soldierly qualities, are being told about the Prince of Wales, who will open the Canadian National Exhibition on Monday, August 25th. The Canadian boys overseas had plenty of opportunity to observe his actions and declare that he seemed to love danger, and at times his conduct bordered on the reckless.

This side of his character is well illustrated by the following extract from Ian Hay's book, the First Hundred Thousand.

"Blaikie lit his pipe—it was almost broad daylight now—and considered.

"Yes," he agreed. "Perhaps. Still, my son, I can't say I have ever noticed staff officers crowding into the trenches (as they have a perfect right to do) at four o'clock in the morning. And I can't say I altogether blame them. In fact, if ever I do meet one performing such a feat, I shall say: 'There goes a sahib—and a soldier,' and I shall take off my hat to him."

"Well, get ready now," said Bobby. "Look."

"They were still standing at the trench junction. Two figures in the uniform of the staff were visible in Orchard Trench, working their way down from the apex, picking their steps amid the tumbled sandbags, and stooping low to avoid gaps in the ruined parapet. The sun was just rising behind the German trenches. One of the officers was burly and middle-aged; he did not appear to enjoy bending double. His companion was slight, fair-haired, and looked incredibly young. Once or twice he glanced over his shoulder, and smiled encouragingly at his senior.

"The pair emerged through the archway into the main trench, and straightened their backs with obvious relief. The younger officer—he was a lieutenant—noticed Captain Blaikie, saluted him gravely, and turned to follow his companion.

"Captain Blaikie did not take his hat off, as he had promised. Instead he stood suddenly to attention, and saluted in return, keeping his hand uplifted until the slim, childish figure had disappeared round the corner of a traverse.

"It was the Prince of Wales."

Mr. Higman Takes Issue Wih Report of Meter Committee

Ottawa, July 31st, 1919.

Editor, Electrical News:

Referring to the report of the Meter Committee of the Canadian Electrical Association published in your July issue, I would ask permission to correct some of the "presumptions" and mis-statements of the Committee.

For instance, the Committee speaks of the beautifully equipped but very little used government laboratory at Ottawa. For the information of the Committee it may be stated that in addition to the twenty-two inspection districts into which the territory of Canada has been divided it has been found necessary to establish three, not one, standarizing laboratories. These are located at Ottawa, Winnipeg and Vancouver. Experience taught us early in the electrical inspection work that one laboratory at Ottawa could not be used for the whole country, the distances being so great. It was found that no matter how carefully we might calibrate the inspectors' standards we could not depend on their reaching their destination in good condition if the distance was greater than five or six hundred miles. Notwithstanding the care taken in packing and the fact that our shipping boxes have been supplied with an additional bottom with springs to take the impact due to rough handling, we have found that the effect due to vibration on the trains would put the instruments out of calibration if senf on longer distances than those mentioned. Hence the necessity for creating the two branch laboratories in the west. Even under present arrangements we sometimes experience difficulties with our Halifax instruments.

Now I am not concerned very much about the "beauty" of our equipment, but I am concerned about the adequacy thereof so that the primary units of electrical measure may be accurately produced as required by the Electrical Units Act. As to the laboratories being little used, that is a question on which the Committee is evidently not qualified to speak. Had the Committee sought information on the subject it would probably have reached a different conclusion. Our inspectors' standards are required to be sent into the laboratories for adjustment and recalibration not less frequently than once in three months and oftener if the inspector has the least suspicion as to their accuracy. In this way there is a constant stream of instruments coming to and going from the laboratories. In addition to this, departments such as the Public Works, Militia, Marine and Fisheries (Wireless), are constantly sending in electrical and gas apparatus for adjustment and standardization. That the electrical companies generally do not use our laboratories more is to be regretted, for it should not be overlooked that our standards are the legal standards of electrical measure for Canada, and it would seem to be desirable that all should work from the one source or fundamental base.

The excuse given for not using our laboratories more is that the fees are too high. Let us see how this works out. The fee for adjusting and calibrating a single phase indicating or rotating standard wattmeter is $1.25. Under the most favorable conditions it will take two men half a day to do the necessary work. If the instrument-maker has to make adjustments necessitating retests, then the time of three men is taken up, sometimes a whole day, for it must be understood that the work has to be thoroughly well done. Is the charge of $1.25 too great under such circumstances? For polyphase instruments and more involved tests the charges are, of course, correspondingly higher. With regard to the meter inspection fee it may be stated that 90 per cent. of the meters tested come under the 60c tariff, the lowest fee imposed by any county in either Europe or America.

The report of the Committee suggests that there should be a sort of perambulating laboratory making visits with primary standards to the different companies throughout the country. The Committee's idea of primary standards must be fairly crude if it considers for a moment that such a performance is possible. Secondary standards such as the companies and our inspectors are using can only be adjusted and standardized under laboratory conditions.

Now as to the bogie of the surplus. Taking the revenue and expenditure for the past eight years we have the following: Revenue $997,623; expenditure $859,468, showing an apparent surplus of $138,155. These figures do not, as they should, include any charge for the laboratory staff at Ottawa, that is, the chief engineer, his assistants, stenographers, etc., which averages approximately $16,300 per annum or $130,400 for the eight years, showing the real surplus for this periiod to be $7,755. The departmental accounting expense is not charged against the services.

We are aware that a propaganda has been put out by the Hydro-Electric Commission of Ontariio for the purpose of placing the weights and measures system in the hands of the provinces or at least in the hands of the Hydro-electric Commission in so far as Ontario is concerned. What would be the result should the propaganda succeed? The Commission is a seller of electricity and is seekiing to verify their own measuring devices. This would be tantamount to saying to a grocer "you may test your own scales and give yourself a certificate as to their accuracy." It should be clearly understood that the electricity and gas inspection services form part of the weights and measures system of Canada, and is specifically placed under federal authority by the British North America Act. Consequently an amendment to the Constitution will be necessary in order to bring the services within provincial jurisdiction.

In conclusion permit me to express my regret that the Committee did not think it worth while to consult the Department before putting itself on record with criticisms that are scarcely fair and in some instances not in accordance with the facts. Even now I would invite the Committee to a consultation in order that a better understanding and more efficient co-operation may result.

Ormond Higman,
Chief Engineer.

The Nova Scotia Board of Public Utilities has ordered a new scale of rates to be charged by the Maritime Telegraph and Telephone Company amounting to about twenty per cent. increase. It will yield about $180,500 additional revenue, of which $155,000 is to be paid in increased wages and the balance is consumed in taxes that have been levied since the war began in 1914. The chief feature of the increase is the establishment of the measured service system for business telephones in the city of Halifax. The business telephone flat rate is increased $3 a year, and the maximum number of messages that may be sent for that sum is sixty per month. After that number, the charge is to be three cents per word up to 100, and two and a half cents on all words over 100. The added charge on all telephones over the province is three dollars per instrument.

The Laurentide Power Co., Ltd., Grand Mere, P.Q., has let a contract to Fraser, Brace & Co., Ltd., Montreal, for the sinking of caissons and the construction of piers for a new tail race block. Three large pneumatic caissons will be put into place this season, so that work on the completion of an addition to the power house to provide for three more units can be done with the least possible delay after the units are needed. The caissons will be ten feet wide and sixty feet long. The deepest part of the deepest caisson will rest from thirty-five to forty feet below the water level. The cost will likely be in the neighborhood of $150,000.

Extension to the Ontario Power Company's Plant

Unique Features are Wood Stave Pipe 13½ ft. in Diameter and 6700 ft. Long Largest Differential Surge Tank, and Power House with Walls Designed to Withstand 40 ft. Rise in Tail Water—30,000 Kv. a. Added

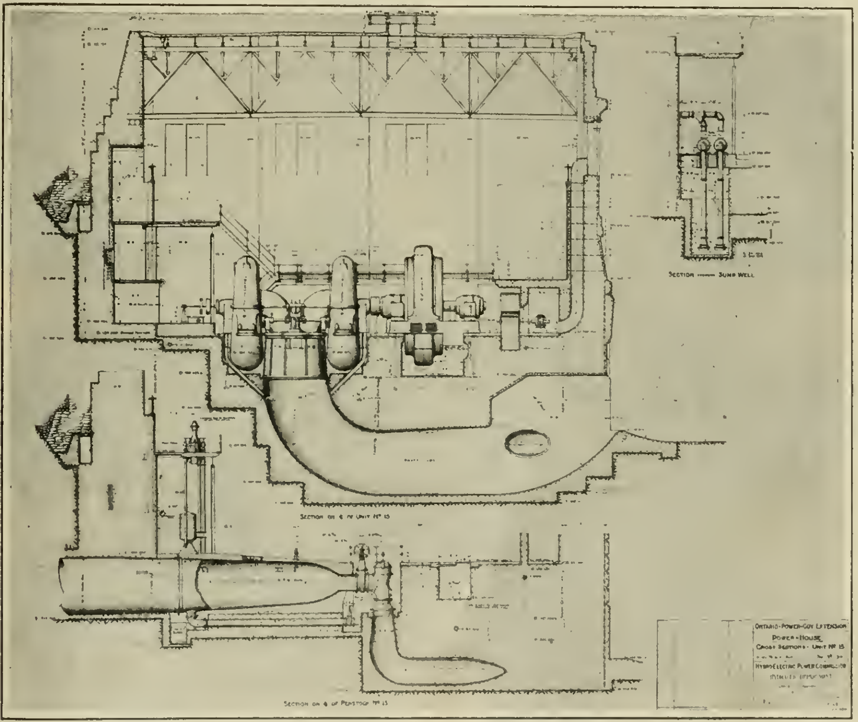
Owing to the power shortage caused by the extra energy needed for essential war industries and the fact that two of the plants at Niagara Falls had reached their capacity, work was commenced in March, 1918, on an extension to the Hydro-electric plant of the Ontario Power Co., at Niagara Falls, Ontario. Completion of the work within twelve months after it was started not only adds from 40,000 to 50,000 horse-power to the plant, but also constitutes a fine record for the engineers entrusted with the work. Although the demand for energy created by the war emergency has ceased to exist, the demand created by the large number of new industries attracted by the power facilities offered by the Hydro-Electric Power Commission, has already appropriated a large part of the additional output provided by the new unit.

The construction of this extension involved the excavation of 133,000 yards of earth and 14,000 yards of rock to permit the placing and erection of a 13.5 foot diameter wood stave pipe 6,700 feet long, a 13.5 foot diameter steel distributor 179.5 feet long, a 60-foot diameter steel differential surge tank 94 feet high, four Johnson hydraulic operated valves, two 10.5 foot diameter penstocks and two 20,000 horse-power turbines with direct connected generators, also the erection of the additional power house to house these units.

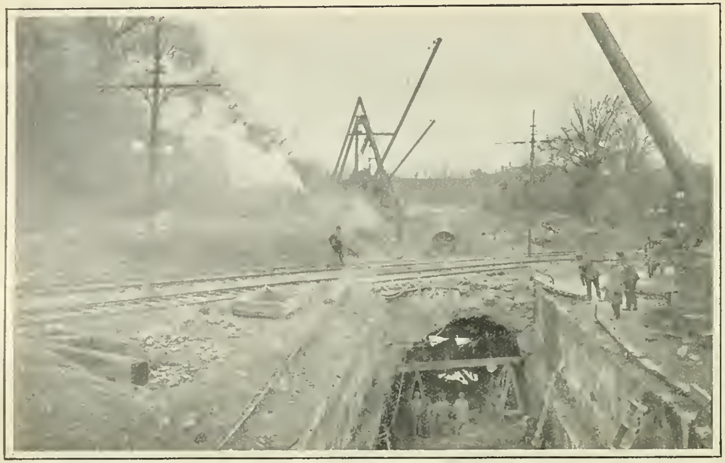
One of the Largest Wood Stave Pipes Ever Built

Unique features about this extension are the wood stave pipe, which is one of the largest ever built, the differential surge tank which has the largest diameter and has also the greatest height of any similar tank not equipped with an auxiliary spillway, and the power house walls, which were designed to withstand a pressure due to a 40 foot rise in tailwater elevation, this extraordinary condition having occurred in the year 1909.

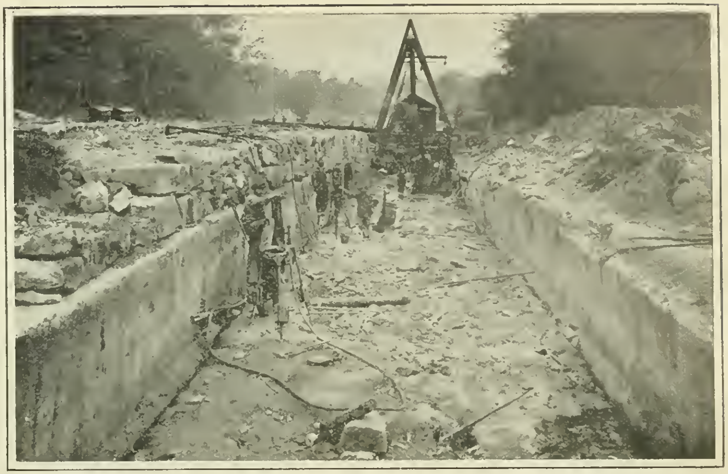
The original plant of the Ontario Power Company as controlled and operated by the Hydro-Electric Power Commission, consisted of an installation of fourteen turbines, seven with a rated capacity of 11,800 horse-power, five rated at 15,000 horse-power and two at 16,000 horse-power, making a total of 189,600 horse-power. The generators, which are direct connected, have a total rating of 149,012 kv.a. Water


Section — Sump Well
Section on ℄ of Unit No 15
Section on ℄ of Penstock No 15
Ontario-Power-Co's Extension
Power-House
Cross Sections - Unit No 15
Hydro-Electric Power Commission

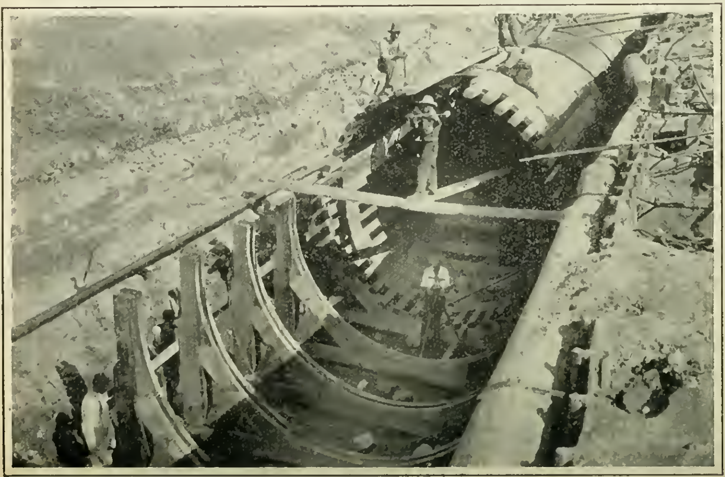
Section through power house extension on centre line of No. 15 unit. Also section of No. 15 penstock



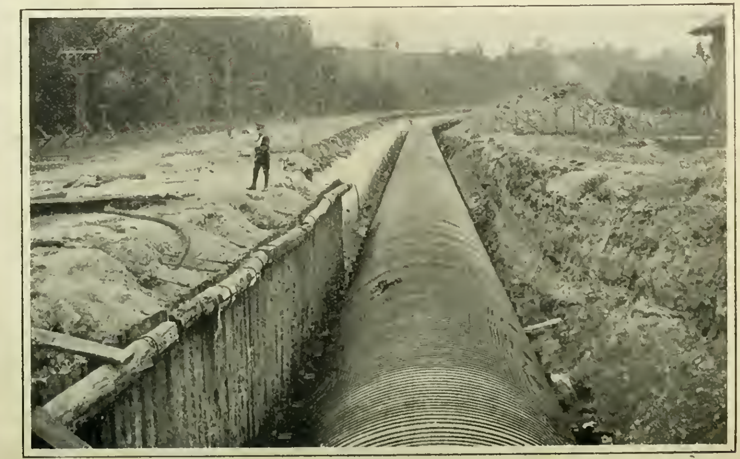
Trench for wood stave pipe through rock section, showing tunnel beneath International Railway Company's tracks. Both sides of cut are channeled here



Rock excavation in pipe trench near International Railway crossing. Rock drills at work



Erection of wood stave pipe, using saddles as forms



No. 3 conduit completed, showing method of bracing Lackawanna steel sheet piling between conduits Nos. 2 and 3 was supplied through two 18 foot diameter conduits, each approximately 6,600 feet long, having a combined maximum capacity of about 162,000 horse-power.

No addition to the forebay to accommodate the new conduit was necessary since the forebay and gatehouse were built to accommodate a third conduit.

The existing No. 1 conduit, which is of steel plate construction, was installed in 1903, while No. 2 conduit, which is of reinforced concrete construction, was installed in 1910. This second conduit, when inspected in April, 1918, after being in service eight years, showed no signs of deterioration, although a velocity of 25 to 28 feet per second had been maintained during operation, nor was there any vegetable growth whatever appearing on the walls.

Excavation for distributor and valve chamber

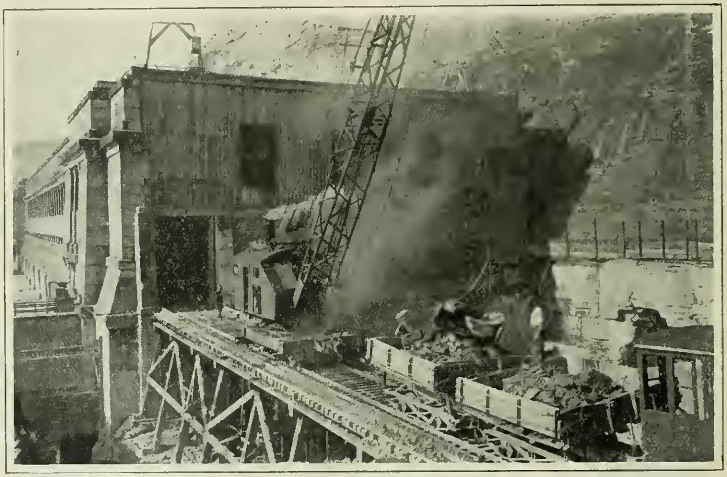
Features on New Conduit

No. 3 conduit, the one recently constructed, is 13.5 feet inside diameter. The staves are of B. C. fir 4 inches thick by 6 inches wide and banded with 7/8 inch diameter steel bands, in two sections with two shoes. The pipe is carried on timber saddles spaced at 4½ foot centres except where the pipe is concreted in place. Connection is made with a 20-ft. diameter thimble at the gatehouse by means of a reinforced concrete reducer 25 feet long. The connection between the wood stave pipe and the concrete reducer is made by means of another steel thimble 13.5 ft. in diameter and 6 ft. long. This thimble, which projects 2 ft. from the concrete reducer, extends 1½ ft. into the wood-stave barrel. The union between the wood, and the thimble was sealed by tightening the bands around the staves. Connection with the surge tank and penstocks is made by means of a steel distributor, the diameter and length of which are 13.5 and 179.5 ft., respectively. The steel distributor is united to a section of reinforced concrete pipe leading to the surge tank. The concrete pipe is laid on a horizontal curve, the end of which bends upward through 90 degs. to form an elbow connection with the centre of the bottom of the surge tank.

The excavation for the trench for the wood stave pipe line was handled from the cut by shovels, derricks, and locomotive cranes. The difficulties in this work were varied and in some places severe, due to the close proximity of No. 2 conduit and to large quantities of water which were encountered at the upper end of the pipe line and at Dufferin Island crossing. A portion of the excavation was deposited along the sides of the cut for back-fill while the remainder was placed on dumps located at convenient points.

Saddles Supporting Pipe

The saddles used to support the pipe are built-up timber sections so constructed as to make a continuous form for the lower half of the pipe. Mud sills were used under the saddles through the earth cut, in order to distribute the load of the pipe and prevent settlement as far as possible. Through the rock cut the mud sills were left out and the lower limits of the saddles were placed on the rock which was evened up to grade after excavating the trench. They served also during the construction work as forms for the lower half of the conduit. These saddles were designed not only to support the finished conduit in its proper line and grade; but also to prevent diametrical deformation caused by uneven settlement of backfill, or uneven hydrostatic pressure when the pipe may not be running full. Prevention of spreading of the upper ends of the saddles is obtained by cantilever action in the upper 3 ft. of the ribs of the saddles. The cantilever action is obtained by the stiffening effect of two ¾-in. bands in each saddle, which enter the structure of the saddle about 3 ft. below the tops of the ribs, which pass around under the lower side of the conduit and which react against heavy cast-iron washers braced against diagonal offsets in the ribs of the saddles.



Excavation at site of power house extension

Drainage of Pipe Trench

On account of the bottom of the trench being below the water level in the Niagara River for the greater portion of its length it was necessary to provide ample drainage for the pipe trench. For 1,000 feet at the upper end, and 825 feet at the lower end, the pipe is concreted in place. This was necessary in order to allow the pipe in these sections of the trench to be backfilled and thus restore the surface of the park to its original condition.

Steel Distributor to Connect Penstocks

The steel distributor at the lower end of the wood stave pipe is made of ⅝ inch steel plate and is 13.5 feet in diameter and 179.5 feet long. Four penstocks are connected to this distributor by means of bell-mouthed tees made of ½ inch steel plate. The distributor is incased in concrete so as to allow the surface of the park above it to be restored to its original condition. A section of 13.5 foot diameter reinforced concrete pipe 77 feet long connects the distributor with the surge tank. The tees connecting the penstock are riveted together in sections cut from beaver board patterns. In preparing the patterns, wood frames were built around the shop-assembled distributors in such a manner that the framework resembled joists or ribs shaping the tees. The beaver board strips were tacked to these joints, were match-marked and were used as patterns from which to lay out the corresponding steel plates. The patterned plates later were sheared, punched and assembled and bolted to the distributors to insure their assembly in the field.

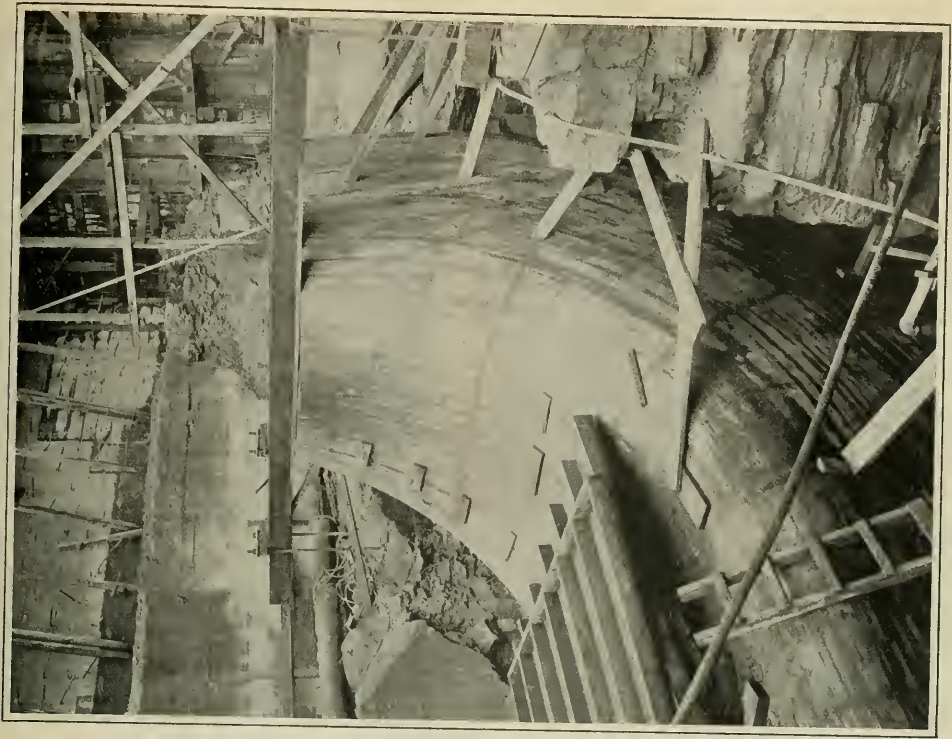
Penstocks Nos. 15 and 16 which deliver the water to the two new turbines in the power house are 216 feet in length. Each penstock ends in a supply pipe with taper connections bolted to the spiral casings of the turbine. The steel plate used in the construction of the penstock varies in thickness from ⅜ inch at the upper end to 13-16 inches at the lower end. The supply pipes are constructed of 13-16 in. plate throughout. The penstocks are designed for a pressure equal to 150 feet of head at the upper end, increasing to 320 feet at the lower end, these figures including pressure rise due to a turbine gate closure time of three seconds, with relief valve closed.

After the penstocks were erected the space between the excavation and the outside of the pipe was filled in with lean concrete. This holds the penstock in position and protects the outside from corrosion.

Unit stresses adopted in designing the penstocks to resist the static heads only, exclusive of metal provided to compensate for corrosion, were 15,000 lb. per sq. in. for tension, 10,000 for shear and 20,000 for compression. The desirability of maintaining maximum joint efficiency necessitated a change in the type of longitudinal joints as the thickness of the shell changed. This efficiency was maintained by adopting triple riveted lap construction in longitudinal seams in plates varying from 3/8 to 7/16 in., and by adopting triple riveted butt construction in the seams in plates thicker than 7/16 in. Single riveted lap construction was adopted for the circumferential joints.

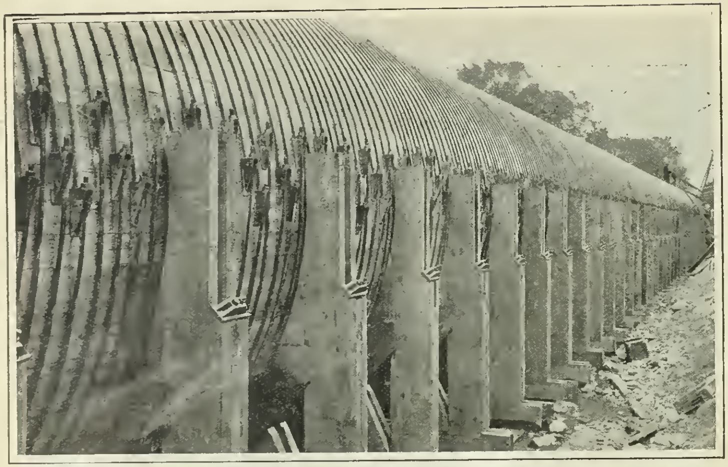
Penstocks and Surge Tank

The new penstocks drop vertically through 48.3 ft. from the distributor, then bend 45 degrees and extend 99 ft. toward the power house, and then bend 45 degs. more and extend horizontally into the power house. Each penstock tube, which is surrounded by lean concrete containing a 12-in. drain discharging into the corresponding draft tube, terminates in a reducer with two openings making 90 degs. horizontal bends from the axis of the horizontal portion of the delivery end of the penstock. The flanges on the openings of a reducer

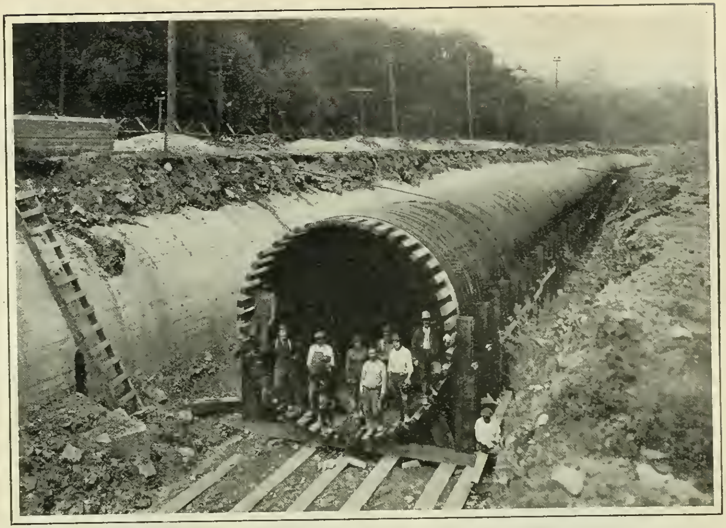


No. 15 draft tube forms in position ready for concreting

Scaling loose material from cliff above power house site. International arch bridge in background

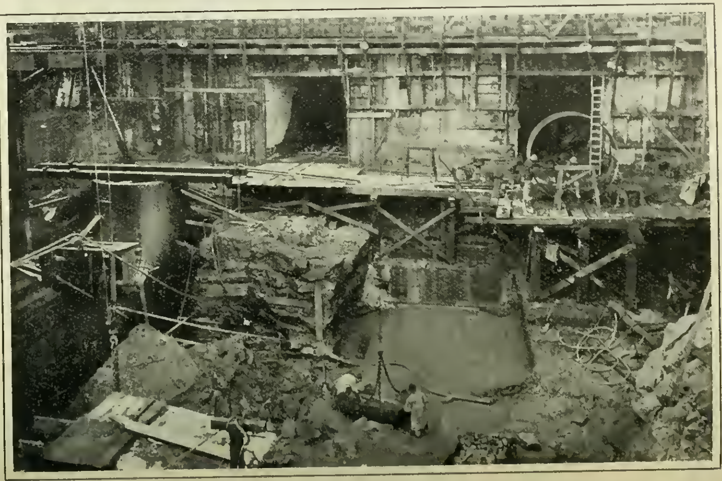


Wood stave pipe, showing details of bands, shoes and saddles



No. 3 conduit, showing mudsills in position; No. 2 concrete conduit exposed

Excavation for surge tank and riser. Sullivan channellers at work



Power house extension site ready for forms. Two tunnel portals appear in background, with penstock No. 16 being assembled. Draft tube form for No. 15 in position at left are bolted to the metal casing of the turbine. The steel plates for the penstocks were assembled in place. Two 10-ft. and two 10.5-ft. valves responding to hydraulic control are set with their top ends approximately 20 ft. below the centre line of the distributor.

The surge tank is of the Johnson differential type, 60 ft. outside diameter and 78 ft. high. The tank is built of steel plate varying in thickness from ¼ inch plate at the top to one inch plate at the bottom, while the internal riser, 12 ft. in diameter and 60 ft. high, is built of ½ inch plate. The roof for the tank is constructed of steel roof trusses with wood covering. Anchors with turnbuckles connect the trusses with the riser to prevent vibration during load changes. The steel bottom of the tank is constructed of ½ in. flat plates, field riveted, resting on a carefully levelled 2-in. grout course spread over a thin concrete footing poured on the solid rock.

The water wheels are double runner, central discharge turbines with spiral casings, running at 187.5 r.p.m. and delivering 20,000 horse-power under 180 foot head. The turbine gates are operated by vertical servo-motors which are controlled by actuators mounted on the gallery. These actuators are equipped with distance speed controllers, hydraulic hand controllers, gate limiting device, manual speed adjuster, gate opening indicator and tachometer. The pressure oil for operating servo-motors is furnished by a helical gear rotary pump, delivering 62.5 gallons per minute against 200 lbs. pressure. The sump tanks are each of 350 gallons capacity and are provided with screens for cleaning the oil before it is returned to the pressure tank.

Surge tank floor assembled ready to lower onto foundation

Power House Designed for Severe Stresses

The power house is of concrete and structural steel construction. In the substructure plain concrete has been used throughout except for the concrete over the draft tubes, which has been reinforced for the upward pressure, which will occur with high water in the river. The generator pits, air ducts and sump well are also reinforced to prevent injury developing from the temporary severe loading of portions of the structure during the erection of the units and from vibration when the plant is in operation. In the superstructure reinforced and plain concrete and structural steel are used.

In order to protect the power house against a recurrence of the high water conditions which prevailed in 1909, the window sills in the front and end walls were placed at elevation 388 and the walls designed to withstand pressure due to water at this elevation on the outside power house. This necessitated an unusual amount of reinforcing steel. The steel work for the interior columns, roof trusses and crane was designed to act independently of the walls, so that it could serve in place of falsework for the erection of the machinery.

Hydraulics of Plant

The hydraulics of the plant are of more than ordinary interest, due to the fact that each of the three pipe lines and surge tanks that have been installed differ considerably. For this reason an excellent opportunity is presented of making a comparison of their respective hydraulic characteristics and capacities.

No. 1 tank has very little capacity and is of the simple tank type. Its only function is to limit the surge pressure on conduit No. 1 during load changes and provides entrance to a spillway for discharge of water at times of load rejection.

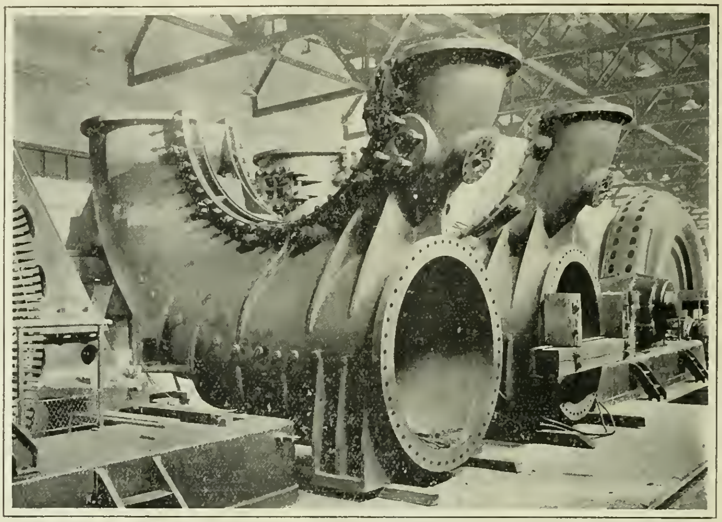
No. 2 surge tank, of the Johnson differential type, was the first tank of this character ever built. This tank serves the double purpose of relieving pressure surges and furnishing or storing water during load changes while the velocity in conduit No. 2 is being accelerated or decelerated. It is also equipped with a spillway as an additional safeguard, to prevent spilling over the top at times of abnormal surge, and to limit the height which would have been requred without this provision.

No. 3 surge tank is of the same type as No. 2, but has no spillway. Its design is such that full load rejection under the most abnormal conditions will not cause overflow.

During 1913, a series of tests was made to determine the hydraulic characteristics and carrying capacities of conduits Nos. 1 and 2, also of penstocks Nos. 1 to 14, inclusive. The results of these tests indicate some very striking facts regarding the relatively greater carrying capacity of concrete pipe as compared with riveted steel and also the exceedingly smooth surface that can be obtained with concrete if proper and careful construction methods are used.

The Electrical Equipment

The generating equipment consists of two 15,000 kv.a 75 per cent. power factor maximum rating, 3 phase, 25 cycle, 187.5 r.p.m. horizontal, shaft water wheel type generators These generators will have approximately the same over-all



Bottom sections of spiral casings of turbines Nos. 15 and 16

dimensions as the 8775 kv.a. generators originally installed for the Ontario Power Company, by the same manufacturer. Each generator will require 60,000 cubic feet per minute of air to enable the machine to carry its rated load with the specified temperature rise. The scheme of ventilation involves, (a) the enclosure of the sides of the generator armature and rotor above the floor line and the top of the generator pit around the machine with a sheet steel housing; (b) the installation of a pair of motor-driven blowers for each generator to deliver the required volume of air into the generator pit, and, (c) the use of fan blades on the generator rotor to force the air from the pit through the ventilating ducts in the machine. One blower unit is used on each generator for normal operation, the other blower acting as a stand-by.

Three exciters will be installed in connection with these two machines, 125 kv.a., 250 volt, direct driven by 185 h.p., 2,200 volt, 3 phase induction motors. These, as well as the generators, are being supplied by the Canadian General Electric Company; also the 200 h.p. starting auto-transformer and the necessary switching equipment and Tirrill regulators for the exciters.

The new construction was carried out under the direction of the technical staff of the Hydro-Electric Power Commission of Ontario, of which Sir Adam Beck is chairman and F. A. Gaby is chief engineer. The technical staff responsible for the design and construction includes H. G. Acres, hydraulic engineer; T. H. Hogg, assistant hydraulic engineer; M. V. Sauer, designing hydraulic engineer; E. T. Brandon, electrical engineer; A. H. Hull, assistant electrical engineer; A. V. Trimble, construction engineer; Walter Jackson, resident engineer; J. F. McGraw, general superintendent of construction; F. A. Burgar, field superintendent.

The contract for the structural steel for the extension was awarded to the Standard Steel Construction Company, Port Robinson, Ontario. The erection of the steel was carried out by the construction department of the Commission. The Pacific Coast Pipe Co., Vancouver, B.C., supplied the wood staves for the pipe line. The generators were made by the Canadian General Electric Company and the turbines by the S. Morgan Smith Company, York, Pa. Other materials and equipment were supplied as follows: Bands and washers, Steel Company of Canada, Hamilton; shoes, Malleable Iron Company, Owen Sound, and Pratt and Letchworth Company, Brantford, Ontario; steel distributor, surge tank, penstocks, valve casings and supply pipe, Canadian Des Moines Steel Company, Chatham, Ontario; Johnson valves, Larner-Johnson Valve and Engineering Company, Philadelphia, Pa.; pressure regulators, Wellman-Seaver-Morgan Company, Cleveland, Ohio; turbine governors, the Lombard Governor Company, Ashland, Mass.; servo-motors, Canadian Allis-Chalmers Company, Toronto; gate valves, Chapman Valve Manufacturing Company, Indian Orchard, Mass.; blowers, Canadian Blower and Forge Company; potheads, Standard Underground Cable Company, Hamilton; conductors, Eugene Phillips Electrical Works, Montreal; switches and bus bar supports, General Devices and Fittings Company, Chicago, and A. H. Winter-Joyner, Ltd., Toronto.

Montreal Harbour Contracts

The Montreal Harbor Commissioners have let the contracts for the equipment for the electrification of the harbor. A large number of tenders were received. The Canadian General Electric Company will supply the generator set, switchboard, lighting transformers, etc., for the substation; the contract includes a 1500 h.p. synchronous motor, direct-connected to two 500 kw. 1200 volt generators. The overhead catenary apparatus goes to the Northern Electric Company, Ohio Brass Company and the Canadian General Electric Company. The Standard Underground Cable Company of Canada will supply the control wires, the Canada Wire and Cable Company the feeder control wires and the Steel Company of Canada the steel stranded wires. The contract for the wooden poles has been let to Lindsay Brothers, represented by Mr. Irving Smith, Montreal, and that for the steel poles to Wonham, Bates and Goode, inc., Montreal. The work of construction will be commenced about the 1st of September and will be carried out by the Commission's staff.

Wireless Telephone Transmitter for Seaplanes

Flying Boat Type Developed by the American Marconi Company for Navy Use During the War

By Mr. E. J. Nally

Marked progress in the perfection of airplane wireless telegraph and telephone apparatus is a direct result of exhaustive researches in radio communication which have been conducted during the past two years. Light-weight transmitters having a sending range of 150 miles or more have been developed. Spark apparatus has been employed to a considerable extent in airplane communication, but transmitters utilizing the vacuum tube oscillator have the advantage of permitting either speech transmission or telegraphic signals by damped or undamped oscillations, at the will of the operator.

Practical wireless telephone apparatus of the vacuum tube type is disclosed in the following description of the Marconi type S. E. 1100 set—a comparatively high power bulb transmitter—developed by the Marconi Wireless Telegraph Company of America.

The set was designed primarily for the large flying boats, the H-16 class, of the U.S. Navy, and has fully satisfied every test to which it has been put. In one of the earlier tests in flight over Chesapeake Bay, telegraph signals radiated from a trailing antenna on an H-16 boat were heard distinctly in Washington, D.C., over a distance of 120 nautical miles. Subsequent tests with the set used as a wireless telephone permitted the accurate transmission of speech over a distance of 150 miles. The transmitter radiates at two wave lengths, 1600 to 600 meters. For the former wave length a trailing wire antenna of .0004 mfd. is employed; for the latter, an emergency aerial of .00026 mfd.

The transmitter is supplied with two 3-electrode tubes of the pliotron type. One tube is employed as an oscillator for the production of radio frequency currents, and the other as a modulator and amplifier of the voice currents communicated to it by the microphone.

The fundamental circuits of the set are shown in Fig. 1, the actual circuit in Fig. 2, a wiring diagram showing the function of the change-over switches in Fig. 3, an installation sketch in Fig. 4.

Description of the Circuits

For best understanding of the operation of the apparatus, it should first be appreciated that if the grid and plate circuits of a vacuum tube include radio frequency circuits coupled inductively, conductively or electrostatically, alternating currents of any desired frequency may be generated. This is the first requisite; other problems, such as rapid change of wave length, satisfactory modulation, and the elimination of disturbing capacities between circuits, arise in the practical set, and are of equal importance. They were satisfactorily solved only after diligent research.

In order to set valve circuits into a state of radio frequency oscillation, it is necessary that the connections be so made that the grid end of the grind inductance will be alternately negative and positive as the plate end of the plate inductance is positive and negative. When the grid and plate radio frequency circuits are coupled with the proper phase relation, any variation of voltage in either the grid or plate circuits will cause minute disturbances in the oscillation circuits, setting them into oscillation at whatever frequency they happen to be adjusted to. For example, a slight variation of voltage in the plate circuit by any means whatsoever, will cause its resonant circuit to oscillate at radio frequency, and the resultant currents will act upon the grid circuit, setting it into oscillation at the same frequency. The resulting radio frequency fluctuations of the grid potential will act upon the plate at the right time to keep the plate resonance circuit in a state of oscillation, and this state of affairs will continue so long as the proper supply of voltage and filament current is maintained, but not otherwise.

The tube is able to generate alternating currents because of its amplifying properties. The energy delivered to the grid circuit in accordance with the actions just outlined will gradually increase in value until a maximum is reached, which is the maximum output the valve is capable of delivering, as may be discerned from the well-known characteristic curve.

Referring to Fig. 1, it will be observed that the plate and grid circuits of the tube contain the coils L_1 and L_2, in inductive relation, each connected through the condensers C_3 and C_4 to the negative side of the filament. The grid oscillating circuit comprises the coil L_2, the condenser C_2 and a protective condenser C_4. The plate oscillating circuit includes the condenser C_3, a part of the coil L_1 and the series condenser C_5. The antenna and earth connections tapped off from the coil L_1 take the place of the condenser C_2 in the grid oscillating circuit. C_2 is called the balancing condenser. In series with the grid is another condenser C_6 shunted by a leak resistance R_1, which maintains the grid at a negative potential.

The system further includes a three electrode tube F', G', P' which amplifies the output of the microphone circuit and simultaneously modulates the output currents of the oscillating bulb.

It will be noted that the plate circuit is fed by a 1500 volt d.c. generator G_2, the positive terminal of which connects to the plate P of the oscillating tube through the audio frequency inductance or transformer L_3 and the radio frequency inductance L_4. The negative side of the generator connects through the milli-ammeter A_1 to the negative side of the filament F. The condenser C_5 is the protective condenser which is generally employed in tube oscillating circuits when the source to the plate circuit is connected in shunt to the plate and to the filament, as is the case in this circuit. The modulating circuit shown to the right of the drawing permits either voice transmission or telegraphy by damped oscillations.

Circuits for Wireless Telephony

For telephony, the microphone M is placed in series with the telephone induction coil P_1, S_4, and the battery B_1, by means of the switch S_1. The coil S_4 is connected to the grid and filament of the modulating tube, and includes in its circuit the battery B_2 through which the grid is held at a suitable negative potential for maximum magnification. The filament and plate of the modulating tube are shunted across the plate circuit of the oscillating tube. The audio frequency choke L_3 may be said to act as a one to one transformer. The radio frequency choke L_4 prevents the radio frequency currents developed by the oscillator from flowing back to the plate circuit generator G. C_7 is a protective condenser for the plate circuit generator.

When the transmitter M is spoken into, speech currents of variable frequencies generated by the microphone are impressed upon the grid circuit of the the modulating tube.

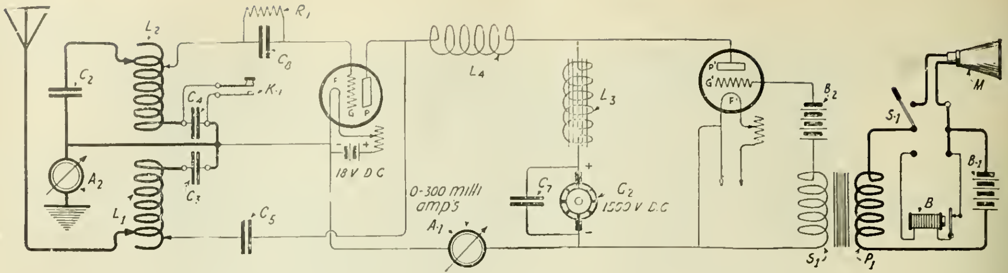


Fig. 1—Fundamental circuits of the wireless telephone transmitter for seaplanes

and, through the medium of the auto transformer L_3, alternating currents are superposed upon the plate circuit of the oscillator. This in turn varies the amplitude of the oscillator currents at speech frequencies, and accordingly the amplitude of the radio frequency oscillations flowing in the antenna circuit. It is essential that the key K_1 of figure 1 be closed for the production of undamped oscillations, for when it is open the tube stops oscillation. Manipulation of this key permits telegraphic signalling by the undamped oscillations produced by the tube.

Telegraphy by Damped Oscillations

When it is desired to telegraph by damped oscillations, the change over switch S_1 is thrown from the microphone to the buzzer B which is energized by the battery B_1. The interrupted currents fed by the buzzer through the primary P_1 of the induction coil produce alternating currents of higher voltages in the coil S_1, which in turn are magnified by the modulating tube, the latter varying the radio frequency currents in the oscillator tube at the frequency of the buzzer. In this way, the antenna radiates damped oscillations in groups, the frequency of the groups varying as the number of interruptions of the buzzer.

A more detailed circuit of the Marconi aircraft set appears in Fig. 2. This diagram not only embraces the fundamental connections of Fig. 1, but includes all necessary switches for the different signalling functions on the 600 and 1600 meter wave. It includes, moreover, a detailed wiring diagram of the filament circuits.

Details of the Filament Circuit

The filament circuit divides at the positive terminal of the 24 volt storage battery B_3, one branch going through the rheostat R_1 to the filament F of the oscillating valve, and the other going through the rheostat R_2 to the Filament F′ of the modulating valve. The negative sides of the two filaments are connected together and to ground. In addition there is provided a potentiometer P_5 connected across across the battery B_3 with a tap leading to the negative potential battery B_2 and on through the secondary of the microphone transformer S_1 to the grid G′.

The object of the potentiometer in Fig. 2 is to compensate for any loss of negative potential in the grid circuit G′, which may be occasioned by the lowering of the voltage of the filament battery B_1.

The switches for shifting the connections from one system of signalling to the other are enclosed in drums. The schematic diagram of these is shown in Fig. 3. The inside and outside rows of jaws on each set are represented by the upper and lower group of dots in Fig. 3. In that figure the left hand pair constitute the wave length changing switch, the middle pair, the sending and receiving switch, and the right hand pair, the signal switch. The first, second and third positions of each switch are indicated by the letters X, Y, and Z, these letters being placed between the two points which the blades of the switch short circuit in that position.

Regarding the action of the oscillating valve itself: When the grid is negative in respect to the filament, no current passes between the grid and filament; but when it is positive, considerable current passes which constitutes a loss in the circuit; but if the grid is held at a constant negative potential this energy is reduced and a more effective transmitter is obtained. The grid potential may be held at a negative value by the insertion of a grid battery, but it can be done in just as effective a way by inserting a condenser in the grid circuit which rectifies the grid currents and holds the grid at a negative potential.

If the leak were not provided, the potential of the grid

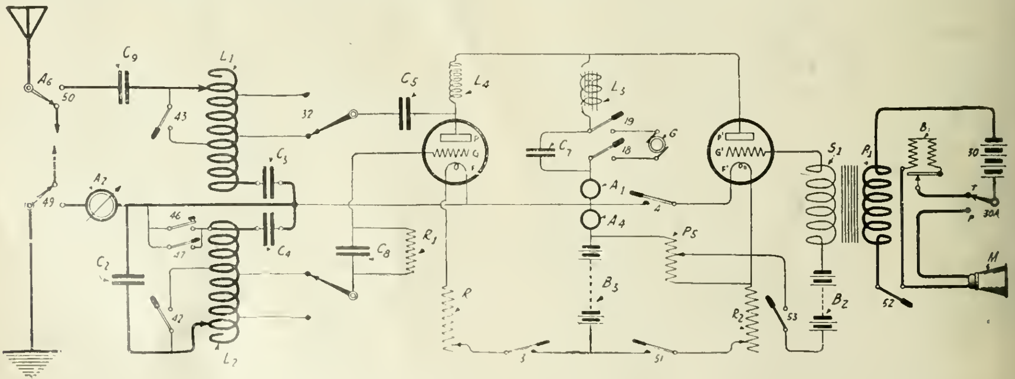


Fig. 2—The actual circuit used in practice

would rise to such a high negative value that all action would be stopped. A leak of proper value definitely limits the maximum negative potential of the grid and, therefore, does away with the necessity for a special grid battery.

Change-Over Switches

The numbers on the separate single pole switches in Fig. 3 correspond with those shown in Fig. 2. The outside row of studs on the wave length changing switch perform the following functions: In the 600 meter position (X at 32 in Fig. 2) the first tap on the upper section of the loading coil L_1 is connected to the plate series condenser C_3, and at 43 short circuits the end portion of the same coil. In the 1600 meter position Y, it connects at 32 the second tap of the coil to the condenser and opens the short circuit.

The inside row of studs on the wave length changing switch performs the same functions for the coil L_2, which is the lower portion of the long single coil mounted in the middle of the rear of the panel in the accompanying photograph. In the schematic diagram, Fig. 6, the blade marked 35 is shown connecting to the first tap of the lower portion of the coil in the 600 meter position, and to the second tap in the 1600 meter position to the grid condenser C_4 with its leak resistance R_1. The actual wiring of the set differs slightly from this, for it was found that the same tap of the coil was correct for both wave lengths. For this reason, there are but two taps on the lower portion of the coil. The first of these is coupled directly to the grid condenser C_4 and does not go through the wave length switch. The blade marked 42 short circuits one end of the coil L_2 in the 600 meter position and removes the short circuit in the 1,600 meter position.

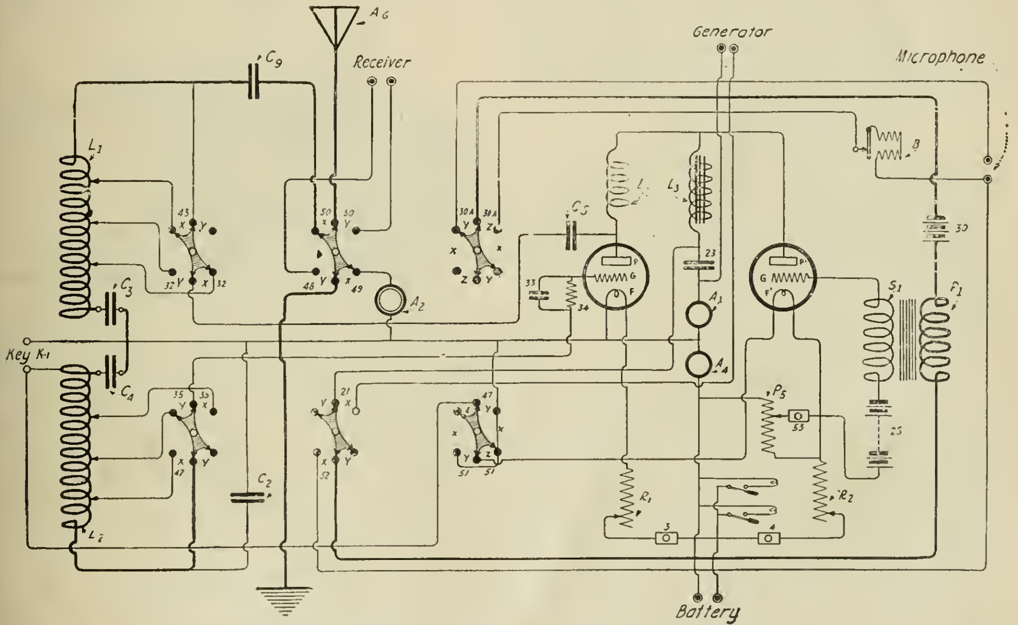


Fig. 3—Wiring diagram showing the function of the change-over switches

The switch marked XY in Fig. 3 serves to connect the antenna A_6 to the transmitter in the "send" position (X) and to the receiver in the "receive" position (Y). In the "send" position the circuit of the antenna at 50 is through the series condenser C_9 to the top of the loading coil L_2, and to the ground. The latter is connected at 49 through the antenna ammeter A_2 to the main ground bus of the set which is the frame.

The inside portion of the "send-receive" switch, in the lower part of Fig. 3, is idle in the receive position Y, but the "send" position X at 21, it completes the 1,500 volt d.c. supply current to the plates P and P of the pliotrons. At 52 it connects the primary of the microphone transformer P_1 to the microphone terminals 28 and to the buzzer B. These connections are opened in the "receive" position.

There are three positions for the signal switch. The first, X, is for continuous wave telegraphy. In this position the connections made in the second and third positions are opened. The second position Y is for telephony; the inside portion of the switch (the upper part in Fig. 3) connects the microphone to the microphone battery, and at 51 the outside portion (in the lower part of Fig. 3) completes the filament circuit for modulating valve and short circuits the key at 47. In the third position, the switch connects at 30 A the buzzer to the microphone battery, and at 51 keeps the filament of the modulating valve lighted, removing the short circuit from the key.

The position of the switches in Fig. 3 does not correspond with their location on the set. All three switches are built to stand a maximum of 10,000 volts high frequency potential, although the potentials developed in the apparatus are considerably lower.

Meters and Their Functions

Space and weight considerations demand the fewest possible measuring instruments. A direct current ammeter A_4 is connected in series with two filaments and reads the total current taken by both of them. The instrument's scale registers from zero to 10 amperes; to read the current in either filament it is merely necessary to cut out the other one. This may be done by means of two small switches marked on the set "oscillator filament" and "modulator filament."

The principal indicator for checking up the proper operating conditions of the set is the plate current drawn by each of the valves from the dynamotor, the voltage of which, as already mentioned, is 1,500 volts. This reading is obtained from the plate current ammeter A_1 of Fig. 2, connected in the ground leg of the supply circuit. This instrument reads from zero to 300 miliamperes and measures the total plate current taken by the oscillator and modulator. The maximum voltage developed by the dynamotor is 1,600 volts, and the vacuum tube generally will cease to operate when it falls below 1,100 volts. The generating tube will oscillate over a wide range of plate voltages if the filament current is kept below a certain critical value. The filaments of the pliotrons are designed to operate on 18 volts.

Wiring

The entire set is wired with No. 12 B & S bare soft copper wire with empire cloth tubing slipped over it as insulation. No terminal lugs are used; the ends of the wires are bent in the shape of an eye which fits the stud terminal and is passed around it in a direction that tends to make the wire grip the stud when the nut is tightened.

The wiring has been so located that small or disturbing capacities between the wires are avoided.

Structural Considerations

Owing to the vibration of the airplane every possible precaution has been taken to prevent the fastenings working loose. Special steel lock washers are used throughout the set. The general scheme of construction is such that the main supports and fastenings will bend before they break, wood or any material which splits or fractures, having been elimnated. The steel wire cross braces shown in the photograph make the structure an extremely light and a surprisingly rigid unit.

Power Supply

The primary source of energy is two 12 volt, 50 ampere hour batteries of the Willard lead type similar to those used in automobile starters. The filaments of the two pliotrons are operated through a rheostat directly from the 24 volt storage battery. Since the tubes require a plate e.m.f. of 1,500 volts d.c., a small dyna-motor, driven by the 24 volt storage battery, is supplied. The armature has two windings in the same slots, one connected to the 24 volt commutator at one end, and the other to the 1,500 volt commutator at the opposite end. It is a two-pole machine excited from the 24 volt source. The armature, which runs on ball bearings at 5,000 r.p.m. and draws about 30 amperes on its full load at 450 watts, weighs approximately 50 pounds.

In addition to the 24 volt storage battery, three other batteries are required; two for the transmitter and one for the receiver. These three sets are known as the microphone battery, grid battery and receiver battery. The voltage of the first is 5; of the second 60, and of the third 40. The 60 and 40-volt sets consist of 20-volt units connected in series. They are arranged in a wooden box screwed to the operating shelf. A dilecto terminal block is supplied.

The Support of the Pliotrons

To insure against breakage, the best position for the pliotrons is vertical with the large neck at the bottom. This brings the plate terminal cap at the top and the filament and grid terminal cap at the bottom. In each of the two dilecto rings shown at the top of the photograph, three spiral springs placed 120 degrees apart support a spring cap which fits over the plate terminal cap of the pliotrons. The springs are held by small machine screws which pass through the insulating ring. One of these serves as a terminal, being connected by a pig-tail to the spring tap. In each of the two bottom dilecto rings, three spiral springs, placed 120 degres apart support a special jack block made to take the filament and grid terminals. This block is made in two halves, upper and lower, held together by screws; clamping these spring jacks between them, three posts, which project from the bottom of the jack block, take the ends of the three supporting springs, and are electrically connected by a copper pig-tail to the screw-eyes that hold the other end of the spring to the dileco ring. The two filament terminals of the tube and the grid terminal are brought out to the three screws in the dilecto ring. Thus each pliotron is supported to the rigid frame of the set by 6 springs which are set so that when the tube is in place the top springs pull down and the bottom springs pull up.

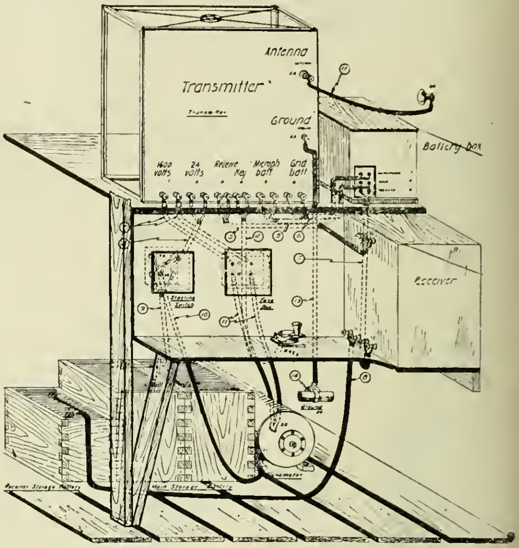


Fig. 4—Sketch showing the installation of the complete set

The mechanical period of vibration of the vacuum tubes in this spring mounting is considerably below that of any vibration that will occur in the seaplane itself. Sudden shocks in any but a horizontal direction are not transmitted through these springs with sufficient violence to injure the tubes.

The positions of all controlling appliances on the main panel board are clearly indicated in the photograph, Fig. 3. The small sub-panel is mounted immediately to the rear of the frame.

Reel Antenna and Accessories

The antenna reel group for this set consists of the reel mechanism, a removable drum with antenna wire and spare drums with complete antenne on them. The wire from the reel runs through a take-off pulley and passes through the lead-in insulator in the side of the hull of the boat. It then passes through either a strut pulley or wing pulley, depending upon the type of the boat.

Reel Mechanism

A cast aluminum plate, clamped to one of the main struts in the hull of the boat, carries a shaft on which the drum turns. On this same shaft, next to the attachment plate, there is a brake drum of cast aluminum, and around this drum a cast iron brake band. The band is sprung over the drum and prevents it from turning except when a cam which is attached to the brake lever springs it open. A pin on the brake drum engages holes in the main drum, when the latter is put on the shelf. The crank by which the main drum is turned has a square hub on which the drum sets. It is slipped onto the shaft, and latches in place. The latch is released by a latch handle just behind the arm of the crank. To remove the drum, to put a new one in place, the operator grasps the arm of the crank, and in so doing also grasps the latch handle and releases the latch. He then pulls the crank and drum off together. One drum may then be slipped off the hub of the crank and a new one put on, and the two slipped back onto the shaft.

Reel Drum and Antenna

The drum is a pressed steel spool, black japanned, and will hold about 600 feet of the standard antenna wire. It has a square hole at its centre which fits the hub of the crank. The antenna wire has a ball at the reel end, and this ball is dropped through a hole in the drum face. The other end of the wire is attached to a swivel, and this in turn is attached to the "fish" or weight.

Lead-in Insulator

The lead-in insulator is a moulded "electrose" fitting, with a metal tube running through it, and a wide flare at either end, so that the wire cannot catch on the ends of the tube even if it enters at right angles. The insulator is held by lock-nuts in a hole in the side of the hull. The antenna connection from the set is brought to this insulator. When the antenna is out, the ball on the reel end of the fire rests against the inside flare of the insulator. The wire is thus entirely disconnected from the reel, and the reel is dead. When it becomes necessary to reel up, the ball is grasped, and of course brings the wire with it. The ball is passed through the take-off pulley and dropped through the hole in the drum face, and the crank is turned. The brake mechanism is arranged so that the cam may be left holding the brake off during the reeling-up process.

Fig. 4 shows the position of the receiving storage battery, the main storage battery transmitter, transmitting key, receiver, and battery box.

The maximum antenna current is 2.5 amperes, with the antenna supplied with the set. This has been found to satisfy all ordinary distance requirements.

The New 70,000 K W. Turbine of the Interborough Rapid Transit Co.

The Interborough Rapid Transit Company, New York, has recently placed in operation at its 74th Street power house, a turbine rated at 60,000 kw. capacity continuously and 70,000 kw. for two hours; it is, therefore, the most powerful in the world. It has three elements, one high pressure and two low pressure, and is the first triple cross-compound turbine to be placed in operation.

The new unit occupies a floor space of 52 x 50 ft., and is about 19 feet high. The high pressure element receives steam at 205 lbs. gauge pressure, and superheated 150 deg. F., and exhausts it into the low pressure elements at 15 lbs. gauge pressure. The two low pressure elements are identical in construction, and each receives one-half of the steam from the high pressure element and exhausts it into the condenser where a 29 in vacuum is maintained. All three elements operate at 1500 r.p.m., and each drives a generator rated at 20,000 kw. continuously, 23,500 kw. for two hours, and 30,000 kw. for a half hour. The generators deliver three-phase, 25-cycle, 11,000 volt alternating current.

The Turbines

Though consisting of three separate elements, the entire machine is started, synchronized, and controlled as a single unit. At the same time, any one or two of the elements can be shut down without interfering with the remainder, so that the high efficiency of a single large machine is combined with the flexibility of three smaller machines. In addition, the three small elements are mechanically much stronger than a single large one would be; the temperature differences in any cylinder are considerably less, and commercially common materials, with moderate blade speeds and stresses, can be used.

All of the turbines are of the pure reaction type, without the usual impulse elements, as this construction is considered preferable in view of the great volumes of steam to be handled. The high pressure turbine is of the single-flow type, and is made of cast steel. The low pressure turbines are of the semi-double flow type; that is, the steam enters near the centre of the turbine and flows as a whole through a portion of the blading, and then devides into two portions, each of which flows through a separate section into the condenser. Since the low pressure turbines must receive high pressure steam in case the high pressure turbine is shut down, the central portions of these turbines are made of cast steel also. All three rotors are equipped with Kingsbury thrust bearings, in order to prevent axial movement.

The Generators

The generators are so connected to the bus bars that any combination of them can be operated in parallel. In practice, however, all three are brought up to speed together, and synchronized through a single oil-switch connecting the generator busses to the main bus. Reactance coils are installed between the various busses, which limit the amount of current that can flow between the generators. Should a short circuit develop in any of the feeder circuits, or a burn-out occur within a generator, the generator affected is disconnected from the busses by a circuit breaker without interfering with the operation of the other generators.

The method of synchronizing the generators is as follows: The field current is first applied to all the generators, and then the throttle valve of the high pressure turbine is partly opened. As soon as the high pressure rotor starts revolving, it will start the rotors of the low pressure turbines through the field current. All three then come up to speed together in correct phase with each other. They are then synchronized with the system and connected to it by closing a single circuit breaker.

The governing mechanism must not only control the unit as a whole, but also each turbine operating separately. Some of the operations performed by the governors are as follows: If serious electrical trouble develops on the circuit of one of the generators of the low pressure turbines, a circuit breaker will disconnect this generator from the buss bars. Relieved of load, the turbine begins to speed up, but before its speed has increased four per cent. its governor shuts off the steam supply from the high pressure turbine. This, of course, raises the back pressure of the high pressure turbine, and a back-pressure valve opens allowing part of the exhaust from the high pressure turbine to pass into the atmosphere, while the remainder goes into the other low pressure turbine. In the meantime, the first low pressure turbine, being without steam, shuts down. When its speed reaches three per cent below normal, the governor admits high pressure steam, and the turbine continues to operate at this speed until the switchboard operator either shuts it down or restores normal conditions.

Should the generator of the high pressure turbine be cut out of circuit, the governor cuts off practically all the steam to the entire system, leaving just a sufficient flow to maintain the speed of the high pressure turbine now without load. The speed of the two low pressure turbines decreases, and when the frequency drops three per cent., the governor admits high pressure steam direct to the low pressure turbines, which then continue operating. 'The switchboard operator can now either restore matters to normal or shut down the high pressure turbine.

Each turbine also has an emergency stop, which will operate automatically in case the governor fails and the turbine begins to race, or it can be tripped by the switchboard operator.

When one of the turbines fails with the entire unit heavily loaded, the governors permit each of the remaining turbines to carry the maximum load of 30,000 kw. This can be maintained for a half hour, which is regarded as sufficient time to get other generators into operation, and thus relieve the overloaded turbine.

Condensers

The condenser equipment consists of two 25,000 square-foot surface condensers for each low pressure turbine. There are four circulating pumps, three Le Blanc air pumps, and four condensate pumps. All of these pumps are turbine driven (the air pumps directly and the others through gears), and all are so arranged that one or more can be put out of service without interfering with the operation of the condenser.

Performance

The steam consumption of the entire unit at its point of best efficiency is 10.7 lbs. per kilowatt-hour. The high pressure turbine and one low pressure turbine, operating together, consume 12 lbs. of steam per kilowatt-hour; and one low pressure turbine alone consumes 14.25 lbs. The total steam consumption at full load is 826,000 lbs. per hour.

The equipment throughout was manufactured by the Westinghouse Company.

The Swiss Railways Extend Electrification of Their Lines.

The introduction of electric traction on the lines of the Swiss Federal Railways has in these latter years, on account of the acute shortage of coal occasioned by the war, received the foremost attention of the authorities and has now emerged as a very practical economic question. The principal nerve of the Swiss railway system is government owned. The electrification of these lines is simplified by the vast store of unused water power which the country possesses. According to an official survey, verified in 1914, including the storing and improvement of lakes, the water power of Switzerland is capable of producing an energy equal to 2,173,000 horsepower. If old plants were replaced by new ones it is even estimated that the highest efficiency of the total water power reserves could be raised to as much as 3,000,000 horsepower. On January 1, 1914, the electric power already in use in Switzerland amounted to 887,000 horsepower. The Swiss Confederation owns some 1800 miles of the entire railway system of the country of 3,216 miles. Of the 1,416 miles owned by private companies 622 miles are already electrical, but only an insignificant percentage of the government railroads has so far been operated by electricity.

The first important Federal standard-gauge road to be chosen for electrification was the Gothard Railway, one of the important international highways, featuring moreover in many sections the brilliantly conceived engineering of mountain railways. The electrification of the 68 miles section Erstfeld-Bellinzona was approved in 1913 and it is expected that it will be opened this fall. This section, with 28 per cent. of its length consisting of tunnels and a grade ct 2.5 to 2.7 per cent. for 25 miles, was chosen for an experiment because of its enormous traffic with Italy, which caused large consumption of coal with resulting smoke in the tunnels. The sections Bellinzona-Chiasso and Erstfeld-Lucerne are expected to follow in 1921. A series of plants yieldiing 70,000 horsepower is planned for eastern and central Switzerland.

The cost of electrification of the Erstfeld-Bellinzona line is estimated at $8,000,000. The cost of electrifying the entire Federal railway system is estimated roughly at $200,000,000.

In 1918 the electrification of the following railways using steam traction was decided upon and work on them commenced at once; the sections of the Federal railroads Sion-Brigue and Berne-Thun; the section Hasle-Langnau of the Emmenthal Railroad and the section Bevers-Filisur of the Rhaetian Railroads. The to-be-electrified section Sion-Brigue will be a continuation of the electrical traction Simplon tunnel which was opened for traffic in 1906, with its northern exit at Brigue. The Berne-Thun line, connecting with the electric Berne-Lotschberg-Simplon railway, which latter was inaugurated in 1913, has already been opened for traffic in May last. It now provides excellent and frequent train connections between the Swiss Capital, the Bernese Oberland resorts and—in connection with the Lotschberg liine—the Valais and Northern Italy.

The new locomotives which are being used by the Swiss Federal Railroads on the section Berne-Thun, besides those of the Berne-Lotschberg-Simplon line, are each equipped with four single phase, alternating current motors, each of 450 horse-power. Tht electric parts were furnished by Brown-Boveri & Company, Baden, and the mechanical parts by the Swiss Locomotive and Machine Company of Winterthur. The electrification works on the Bevers-Filisur line were completed by the middle of last April and from April 16 steam engines have been duly replaced by electric motors, the current being supplied by the power station of Bevers, which furnishes the necessary energy for the Engadiine lines which were electrified in 1913.

New Books.

Electric Power Transmission—by Alfred Still, professor of electrical design, Purdue University; second edition, revised, enlarged and re-printed; McGraw-Hill Book Company, Inc., 239 West 39th Street, New York, publishers; price $3.50. When this book was published originally under the title "Overhead Electric Power Transmission" its suitability as a college text book was not seriously considered. The author states that it has, however, been used by a large number of technical schools and colleges and in this second edition changes have been made which should enhance its value as a college text without detracting from its usefulness in the field of practical engineering. The principal addition is an entire chapter treating of underground conductors. The following chapter headings indicate the scope of the work: Electrical Principles and Theory—Elementary; Economic Principles and Calculations; Electrical Principles and Calculations; Insulation of Overhead Transmission Lines; Protection against Lightning—Transient Phenomena; Transmission of Energy by Underground Cables; Transmission of Energy by Continuous Currents; Mechanical Principles and Calculations—Overhead Conductors; Transmission Line Supports Inductance of Transmission Lines with any Arrangement of Parallel Conductors; Specification for Wood Pole Transmission Line; Specification for Steel Tower Transmission Line. Well illustrated; 400 pages; size 4 x 9 inches, in McGraw-Hill standard cloth binding.

The Contractor-Dealer

Power and Light in the Country—The Farmer and Other Rural Dwellers Want the Advantages of Town Life, Without Its Drawbacks—A Golden Sales Opportunity

Many people do not yet realize that we are just on the eve of a tremendous development in the use of farm lighting and power plants. As an example of their confidence in this field the Northern Electric Company state that each month they use some twenty Canadian farm papers and that up to August 1 over three million and a half advertisements had been placed in Canadian farm homes.

The farmer has his telephone, his rural mail delivery, and his automobile. Now he wants a water supply in his home like they have in the city, and light and power appliances to take the place of the servants they can't get. There are a few cases where central station lines supply the need, but in the vast majority of cases this is not so. The small gasoline-electric power and light plant is the solution.

It is not generally known, either, that in Canada and the United States there are somewhere between one hundred and twenty-five and one hundred and fifty different firms manufacturing farm power and lighting plants. Some of these do not carry on a very aggressive campaign, but the number of real live firms is considerable, and the amount of publicity being distributed among the farmers and other rural dwellers is, in the last five years, simply colossal, as is indicated by the one instance quoted above.

A big question is—who's selling these plants? We were asked the same question the other day and naturally replied—why the contractor-dealer, of course. We got the answer, "You're wrong. We've tried to interest the contractor-dealer for years and now have about given him up. The contractor-dealer isn't a salesman. He ought to be, but he isn't." If this is true, it's too bad, and we're afraid it is quite true. This means then that someone else, quite outside the electrical business—some one in the salesman class—is going to cash in on this big business of selling power plants all over the country.

And to think, too, that the profit on one of those plants is as great or greater than the profit on a house-wiring job —with none of the uncertainties of the contractor's business.

Yes, it seems to be a fact that the men who are selling these plants—doing it easy, too—are anything but electrical men. Down in London this week, the Northern Electric Company has a convention of all their agents in Western Ontario, and it is said there isn't an electrical man among them. But they believe in these plants for the farmer—they have been sold the idea themselves, in salemen's parlance and so they are able to go out and "sell" the farmer. Mr. T. R. Campbell, from the head office of the company, is down in London, reading a paper to the "boys," and we got him to let us have a few extracts. They are of general interest and so are reproduced below. Perhaps they will help to convince some contractor-dealer that he is missing a good thing.

Expected Growth of Country Towns

The automobile industry affords an excellent comparison of what may be expected of the power and light plants within the next few years. Since 1914 the increase in the number of automobile licenses in Canada has increased three hundred per cent., the following are the exact figures:

1914—	69,598
1915—	89,944
1916—	123,464
1917—	197,799
1918—	275,746

Of the total amount for 1918, 114,376 were in the Province of Ontario. It is safe to say that of this three hundred per cent. increase, the growth in rural districts has been as great, if not greater, than in the cities. Furthermore, this growth has taken place during the war period. I recently visited fifty farms in a representative farming district, and found that only six people did not have automobiles, and only eight people stated that they did not intend to have an electric plant in two years or less. Thirty-eight of the parties visited had read our advertisements and had become interested in farm plants. Four people were sold plants on this trip, all of whom had never been called upon before.

We believe that practically every prospect will have a plant in three to four years. By prospects we mean these residents in your territory who have reasonably good buildings, and are able to buy a plant without financial sacrifice. We do not want to encourage anyone to buy a plant, who cannot afford to do so without mortgaging his property, or going into debt.

The idea of electricity on the farm must always be sold before an order for the plant is placed; in fact, when you have finally sold the idea, the taking of the order is a simple matter. Keep your prospect's mind on what will do him the most good, even when the price comes up, you have a chance to score. Do not say, this machine is $1,000.00 and this one $500.00, as your prospect will begin to think that perhaps one machine is cheap and no good and the other one unnecessarily high. Get his mind off the price entirely, because he is not yet solid on the idea of electricity. Do this. Say, "Mr. Brown, let us see what size plant is best suitable for your needs." Take him to the stable and walk through the various buildings, go into the cow barns, the horse barns, the big pen and every other building, and say, "You should have so many lights here and a switch beside this door to turn on the lights as you enter. Here you will need an outdoor lamp on an arm for lighting the yard; there should be another light in the carriage driveway, one here in the garage, and another in the dairy." By this time your prospects has begun to see that electricity means light everywhere and you have got him coming along. Then go through the house in the same way, but be sure to have Mrs. Farmer with you on this trip. Then this is the time to talk washing machine, separator, churn, etc., and prospects question of price can now be brought about when his mind is in the most receptive mood.

People buy things only when they are shown a certain definite reason why they should part with their money. This reason must be made to stand out in their minds, of greater importance than the price. The thing to be bought must either be an absolute necessity; be useful; save the prospect money; provide him with greater safety; give him greater comforts; provide him with pleasure; satisfy his pride or improve his living conditions. Think of several things which you have recently purchased, and see if every one of these was not bought for one of these reasons. Some may have been bought for two or three reasons, as the automobile—it is often really necessary, always usseful and surely a source of pleasure. Lightning rods are hardly necessary or useful, they are bought solely to provide safety. Food is bought because it is necessary. Farm tools because they are useful. Buildings are painted to save money. Insurance is bought for safety. New furniture for greater comfort; a cigar for pleasure, and an expensive hat or pair of shoes to satisfy one's pride. Now look at an electric plant and see if you can find any other single article which can be purchased for as many reasons.

Necessary.—The real necessities of life are **Light, Water, Power** and **Food.** And electric power and light gives you three of them.

Useful.—A thing that does but one important thing and does it well is useful. What then of one that will wash and iron clothes, clean house, churn, run separator and milking machine, turn grindstone, wash dishes, pump water for house and stock, light every room in the house and every stall in the barn, charge the auto battery and do a dozen other things.

Save Money.—Everyone likes to save money, but in an electric plant, "money saving" is combined with "better results." To do it electrically is to do it cheaper, better and quicker. Your prospect will want proof of this. The labor of one man is saved in turning a grindstone, running a separator, pumping water for the stock, running the churn, washing machine and in milking, grinding, etc. Remember manpower is equivalent to ⅛ h.p., with the present labor costs including board, and other expenses, every hour of man labor costs 30c. A horsepower will do the work of eight men and at a cost of less than 10c. per hour. It works when you want it to work. Does not have to be paid when idle, requires no room, board, nor washing, never goes on strike, gets sick nor takes Sunday off. An investment for a power and light plant pays a dividend 365 days every year. Compare this with the dozens of machines that the farmers buy, which are used only a few days each year, but have come to be considered as a necessary expense. Reapers, drillers, ploughs, mowers, etc., are not absolute necessities, but it has been found that they pay. To do work in the old-fashioned way would mean that a farmer could not produce his crop at a price which would enable him to compete with others using more modern devices. They have therefore come to be regarded as necessities. These machines each do one thing and one thing only and only for a few days a year. How much better investment, therefore, can anyone ask than a machine which is useful, provides safety, assures comfort, increases pleasure, etc., and is used every day and every night. These very facts must appeal to the judgment of every thinking man.

Safety.—An electric plant may rightly be called a "Safety First" plant. Think of the dangers of a lighted lantern in the barn, the upsetting of a lamp, loose matches, the kerosene can in the wood shed, and how these dangers are eliminated by an electric plant.

Comfort.—Every farmer wants his family to have comfort. It has been demonstrated that the reason way the large number of young folks leave the farm is due largely to the lack of conveniences. Give them the comforts of running water in the kitchen, the bathroom with hot and cold water, and do away with the out-door pump.

Pleasure.—There is real pleasure in an electric plant, pleasure for everyone. Children will enjoy their play more. Women folks will find their work in every room in the house, brighter and easier. It will be a pleasure for the man to turn on the various lights in the stable as he goes about his chores.

Pride.—Every man likes to have a good home, and to think that his family has as much, or even more than his neighbor. If the prospect were to sell his home and had an electric plant, it would be one of the most important things he would feature, and it would go a long way towards increasing the value of the farm. The proudest man in any community is the owner of an electric plant. It will be the most talked of thing on the farm, by the farmer himself, his wife and every member of the family. The same satisfaction of pride goes with an electric plant as in the purchase of a thoroughbred cow, or a fancy driver or a high powered six.

Improved Living Conditions.—Improved living conditions simply means better surroundings, giving one's children a better time, and make their lot in life a whole lot easier than ours has been. Happy homes are made happier by an electric plant. People living in the country have many things which are greater natural comforts than those of the city. There is plenty of air, trees, wild strawberries to pick, and fish to be caught in the brook, but how are these things to be enjoyed? One must stay in the house doing that work, which it seems is never finished. They say that folks from the city who spend their vacation in the country get more real pleasure out of the country than the farmers themselves. It is simply because they are more free to enjoy those things. Canada is essentially a country of home-loving people. These homes have been built after much hard labor. The prairies have been broken and the railroads and telephone lines have brought people closer together. Days of development and pioneering are over in most sections. Now the enjoyment of these years of labor is to be reaped by the pleasure of real comfort, prosperous home life. This is what improved living conditions mean.

It is not to be expected that you will take the time with every prospect, to go over these various points, but you should in every case figure out which argument would best appeal to the prospect. I have known cases where a man bought wholly on account of the dread he had of lighted lanterns in the barn; the Safety Argument appealed to him strongly. Another farmer will have excellent buildings and every convenience but light. The argument of saving money or the necessity of light, may not appeal particularly strong to him, but to add to the completeness of this farm and enjoy those greater comforts, which he can well afford, is undoubtedly the best way to appeal to him.

I have found in selling plants to farmers, or in fact anything, the first thing is to get acquainted and then get the confidence of the prospect and his family, it will then be found that the sales will follow much easier. Many plants have been sold on the first visit, but as a rule it does not do to crowd the prospect too hard, it is better to make three or four calls, than to attempt to close on the first visit, and get such a definite turn-down, that your return is not welcome.

Just a few words about Accessory Sales and Service. In going over your district, you should regularly drop in on those plants which are already installed. These trips can be really profitable. The plant may be touched up a little or names of prospects obtained and some accessories sold. Endeavor to impress on your prospects that you are there to help them in every way; you will then find the business coming easy and it will be a short time before your name will become inseparably connected with everything electric for the farm.

National Association of Electrical Contractors and Dealers Hold Successful Convention

By K. A. McIntyre

Monday and Tuesday were given up to meetings of the National Executive Committee, which also held sessions Saturday morning and in the evenings of Monday, Tuesday and Thursday, giving to the convention a "stick-to-business" air which was the occasion of favorable comment by outside observers. The Canadian representatives on this committee, Mr. E. G. Mundy, for Western Canada, and Mr. Kenneth A. McIntyre for Eastern Canada, were present, and took part in the deliberations for the first time.

The routine business of the National Association is conducted by the executive committee, leaving the convention free for a full program of instructive papers and discussions. The two most important subjects before the executive committee were those of the Bureau of Education and Research and of a National Labor Policy.

Announcement was made by National Chairman W. Creighton Peet that the $100,000 annual fund for the Bureau of Education and Research was practically assured, and that actual steps would soon be taken by putting men in the field. We will see this most important plank of the Goodwin Plan in early operation, improving the dealer as a merchant and the contractor as a man of business.

Some fourteen hours of debate were spent over the question of a National Labor Policy, a subject which has been avoided by the association for fifteen years. The principles were sent on to the convention by the executive committee with the recommendation that they be adopted by the association and returned to the executive committee with power.

On Wednesday morning came the opening session of the convention with National Chairman Peet in the chair, and addresses of welcome by Mr. Burrill, Wisconsin State Chairman, and by Mr. Corcoran, Acting Mayor of Milwaukee, who cordially and humorously turned over the keys of the city. The official photograph was taken following this meeting.

Beginning on Tuesday the Canadian delegation began to arrive, until finally twenty were on hand to represent the Dominion. We were all given a cordial welcome and made to feel right at home. A snap shot of the delegation appears in this issue showing the Canadian party with Messrs. Goodwin, Chase, Comstock and Corcoran. Mr. F. J. Allen, general manager of the Benjamin Electric Manufacturing Co. of Canada, and Mr. W. M. Andrew, secretary of the Canadian Electrical Manufacturers' Association and the Canadian Electrical Jobbers' Association, were also in attendance at the convention though not in the picture.

Mr. Frank Stockdale gave one of his popular talks at the afternoon session on the subject of "Keeping up with rising costs" which developed into an all-round lecture on merchandising with an interesting discussion following.

Messrs. Albert Uhl and E. S. Morley of the Chicago Estimators' Association, gave talks, illustrated with lantern slides, on estimating and overhead, following through actual estimates. Those of us who are familiar with conditions in our business in Toronto, (represented by only three members), could see in these facts a reason for the wide variation in Toronto quotations on electrical construction. Our Toronto and other Canadian members cannot expect to learn more about their business unless they show enough initiative to get out and learn. On one job in Toronto prices varied from $13,000 to $23,000. On one Chicago job estimated before the convention five Chicago quotations varied from $43,600 to $45,217 and without collusion. These results are attained by investigation, study and education. Surely they are worth while, yet some members are "too busy" to go to the convention—possibly too busy losing money.

Tuesday evening was given over to a reception and dance in the Fern room of Hotel Pfister, the convention headquarters. Suffice it to say that our party had a most enjoyable evening.

At 8.30 Wednesday morning several special suburban cars left with all delegates and ladies for Waukesha Beach, a pleasant spot on Peewaukee Lake about 30 miles from Milwaukee. First was given a talk on the problem of absorbing the alien into the life of the community, eliminating the weak points shown in the national policy during the war both in Canada and the United States.

Mr. Goodwin (it was "Goodwin Day") once more surprised us all by repeating nothing he had said before. At the conclusion of his remarks he introduced Mr. Corcoran of the General Electric Co., Schenectady, who promises to be Goodwin the Second. Mr. Corcoran talked very successfully against time, the hour being late, and everyone regretted that he had not hours longer to tell us more. By the most unique and original methods he proceeded graphically to impress upon his audience the principles and opportunities of merchandising electrically. These talks and papers will be reproduced later in this publication.

More than 500 were in attendance at the convention, but there seemed to be many hundreds more electrical people at Waukesha, especially when gathered together for luncheon in the large pavilion. One table was reserved for the Canadian delegation with Messrs. Goodwin, Chase, Peet, Comstock, Stearnes, Corcoran, Kalischer. The afternoon was wisely devoted to sports, the ladies' events being of particular interest. Many took advantage of the opportunity for a swim in the lake and were well rewarded. Returning to Milwaukee, the evening was free for sight-seeing except for members of the executive committee who don't even know what Milwaukee looks like.

Friday morning was devoted to the meetings of several sections in order to give those interested in special features an opportunity to hear papers on subjects to their liking. "Methods of Determining Value of Burned Out Apparatus," by A. O. Kuehmsted, Gregory Electric Co., Chicago. "What Constitutes Efficiency in the Repair Business" by A. Penn Denton, Kansas City, Mo. "Methods of Dealing with the Public," by C. M. Jamison, Milwalkee Ry. & Light Co. "Arrangement and Conduct of a Retail Store," by Phil Polacheck, Milwaukee. "Relations of the Dealer to the Public in Merchandising" by J. R. Tomlinson, Portland, Ore. Fixture Business as a Part of Retailing," A. L. Oppenheimer, Cleveland. Meeting of state and local secretaries with Mr. Wilson of Massachusetts in the chair.

In the afternoon Dr. H. C. Metcalf of the Bureau of Industrial Research, New York City, gave a splendid address on "Human Relations in Industry." Next was brought before the convention the question referred to above in regard to a National Labor policy. After considerable discussion, the principles were adopted and sent back to the executive committee, recommending that a committee of five be appointed to carry the matter further. Routine business completed the sessions.

On Friday evening was held the annual dinner, with an enjoyable menu, enthusiastic singing led by the famous James R. Strong, vociferous applause and a feeling of non-alcoholic exhilaration. Dancing followed and then regrets that the 1919 convention was over, and hopes that we would all meet again in Baltimore, Md., October 6th, 1920.

Saturday morning the executive committee met, disposed of the balance of business and authorized the national chairman to appoint the committee of five to carry on with the national labor policy. This committee, since appointed, consists of Messrs. Comstock, New York, chairman, Hixon, (Boston), Stearnes, (New Orleans), Sanborn, (Indianapolis), McIntyre, (Toronto).

The convention was a great success and Mr. Oppenheimer of Cleveland, convention chairman, Mr. Burrill, Mr. Brauns and others of the Milwaukee committee, deserve the greatest credit for their successful efforts. The ladies were well looked after during their stay, a very complete program of entertainment being provided.

The convention must be considered a success in every way and every Canadian member who availed himself of this opportunity to have a little holiday came home well pleased with his investment.

The following is the personnel of the Canadian delegation referring to the photograph herewith:

The Canadian Delegation.

1st Row, Left to Right.

L. H. Lander, Electrical Contractor, King St. E., Hamilton, Ont.

E. A. Drury, Electrical Contractor, 164 Oakwood Ave., Toronto, Ont.

Kenneth A. McIntyre, Beattie-McIntyre, Ltd., 72 Victoria St., Toronto, Ont.

H. H. Gardiner, Masco Co., Ltd., 91 Queen St. E., Toronto, Ont.

J. S. Latrobe, Chas. A. Branston Co., 355 Yonge St., Toronto, Ont.

2nd Row.

L. K. Comstock.

S. A. Chase.

W. L. Goodwin.

J. A. Corcoran.

3rd Row. (Not including large man standing)

F. T. Groome, 119 Fairview Ave., Toronto, Ont.

E. C. Clarke, The Clarke Electrical Co., 68 Harvard Ave., Toronto, Ont.

A. S. McCordick, Canadian General Electric Co., Ltd., 212 King st. W., Toronto, Ont.

A. C. Lyons, Lyons Elec. Co., Brantford, Ont.

A. W. J. Stewart, Toronto Hydro Electric System, 226 Yonge Street, Toronto.

J. A. Dynes, Elec. Cont. 20 Avalon Place, Hamilton, Ont.

4th Row.

E. G. Mundy, Mundy, Rowland & Co., Standard Bank Bldg., Vancouver, B. C.

F. O. Ellis, Ellis & Howard, Ltd., 9-11 Queen St. N., Kitchener, Ont.

F. M. Davis, Northern Elec. Co., Ltd., 131 Simcoe St., Toronto, Ont.

A. W. Lamont, Canadian Westinghouse Co., Ltd., 158 Portage Ave. East, Winnipeg, Man.

A. S. Edgar, Canadian General Elec. Co., Ltd., 212 King St. W., Toronto.

J.F.S. Madden, Hydro Electric Power Commission of Ontario, 190 University Ave., Toronto, Ont.

Chas. A. Branston, Chas. A. Branston Co., 355 Yonge St., Toronto, Ont.

Not in Photo.

F.J. Allen, Benjamin Elec Mfg. Co. of Canada, Ltd., 11 Charlotte St., Toronto, Ont.

W. M. Andrew, secretary Canadian Associated Mfrs. of Elec. Supplies, secretary Canadian Elec. Supply Jobbers Association, Stevenson Building, Toronto, Ont.

The Servant in the Home

Take advantage of the scarcity of servants to advertise the service of electrical appliances.

Have you a servant in your home?
If so, is she satisfactory?

or

Pretty hard to get a faithful
servant these days?

is a good introduction to an offer to supply "something just as good—or better" in the form of washing machine, dish washer, vacuum cleaner, etc., etc. The servant question is one that interests every passer-by. Take advantage of it to impress upon the householder that the electrical home is a very fair approach to—and the only available substitute for—the good old times.

Renewable Cartridge Fuses Stand Heavy Test

The M. B. Austin Co., manufacturers of the Trico renewable cartridge fuses, is represented in Canada by J. D Lachapelle and Co., Montreal. These fuses have been tested by the Underwriters' Laboratories, Chicago, who report that "the design of these fuses, the quality of material employed, and the workmanship shown indicate that they have adequate mechanical strength to resist the forces incident to their use as protective devices for the circuits for which they are rated." In a circular issued by Lachapelle & Co., it is stated: "The Underwriters' tests have been completed and we have successfully passed all of their requirements for every size of fuse which we make, including from one to 600 amperes on the 250 volt size, and from one to 600 amperes on the 600 volt size. No other fuse manufacturer of renewable fuses has ever secured such an approval."

If there are any Contractor-Dealers or Jobbers who are doing anything unethical in their merchandising let them stick to their own pastures and not look over the fence into somebody's pasture where they think the grass is a little greener than in their own. Let them keep their covetous eyes trained on their own problems and work them out on ethical business lines. You, gentlemen, know what I mean by that. I do not have to state: "Don't cut prices. Don't graft customers by cut-price methods."—S. A. Chase.

How I Increased My Sales 100%

By A Wiring Contractor

What is the matter with us contractors anyway? I used to be the same as the rest, but latterly I believe I'm getting a little common sense. It wasn't so very long ago that I used to scrap with my competitors over a $75 job as if my business existence depended on it. Think of it—cutting prices on a job that at best would yield us a $25 profit. And the provoking part of the whole thing was that the man for whom you were doing a cut-price job didn't seem to care—he'd spend money on other things like water. But the wiring—that was merely looked upon as a necessary nuisance.

That was about the time I began to see things differently. "These men don't care about wiring," I said to myself. "Then why sell them wiring? Perhaps they DO care about the service, the convenience and luxury that follows a good wiring job. I'll try them."

And I did try them and let me tell you it has worked wonders in my business. There are times now when my customer will stand for a $200 or $250 job when formerly he would have grouched at $75. He sees it from the other side, that's all. I talk to him so he sees himself in a cosy armchair with a handsome floorlamp to read his evening paper; feels the warmth of a cosy-glowing radiator on a chilly evening; tastes the crispest of toast and sips the most delicious coffee for his early breakfast. Then I explain the advantages of an electric range, its low operating cost, the sanitary features, its safety and labor-saving qualities and so on and on. There isn't a man who builds a house who doesn't mean to have all these things in a little while and the wiring contractor is largely to blame that so many of the new homes are badly wired.

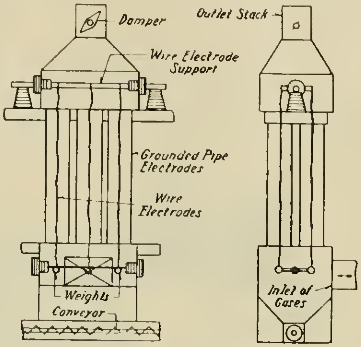
So I hardly ever talk price to a customer any more. I sell him, instead, an electrical home. I find that's the only thing about my business they're interested in, so why cloud the issue with details?

I'm just a wiring contractor and haven't yet begun the sale of appliances, but my common sense tells me the right thing to do is to open a nifty little store. For customers I'll have all the houses I wire, in addition to as many more transients as my windows can catch. In my district there are two hardware stores selling electrical goods, but they just hand them out like monkey-wrenches. I think our goods should be sold by people who understand them and appreciate their value—and can sell some "service" with them, too. It sometimes seems to me the manufacturer makes a mistake letting just anybody handle his goods, but perhaps fellows like me are to blame for not having good, attractive stores; I'm going to try it out anyway.

Principles of Electrical Precipitation

A treater for electrical precipitation is a comparatively simple structure. The accompanying schematic diagram illustrates a typical pipe treater. In general it consists of two large horizontal flues connected together by a number of small vertical pipes. Gases enter through one flue, pass through the other flue to a stack, exhaust fan, or other draft producer. The gas is then exhausted into the atmosphere. Some treaters are operated with an up draft, some with a down draft, according to the particular local conditions to be met. Some treaters employ rectangular passages instead of pipes to connect the two flues. These are generally referred to as plate or box type treaters. The principle of operation for all these types of treaters is the same.

The actual precipitation of the dust or fume occurs in the vertical pipes referred to above. Carefully centered in each, is suspended a small wire or a small chain. These constitute the negative electrode of the treater system. The inside surface of the pipes constitutes the positive electrode. Each wire or chain is carefully insulated from its pipe and from the ground, and is charged to a high potential usually at from 25,000 to 65,000 volts direct current. The tubes themselves are grounded. Thus within each pipe is created an intense electrostatic field. The gases passing through this field become ionized, and the ions travel with high velocity in a direction at right angles to the electrodes causing the field. These highly charged ions are continually colliding with the suspended solid and liquid particles in the gas, and the ions impart a charge of like potential to such particles, which in turn begin to travel towards the electrode of opposite polarity. Since the negative suspended electrode is of much smaller area than the electrode formed by the inside surface of the pipe there is much greater electrostatic stresses per unit of area in the neighborhood of the wire, and as a result far greater ionization about the wire. Thus the gas receives a static charge of the same polarity as the wire, and the solid or liquid particles in the gas receive charges of this same polarity which causes them to be projected against the inner surface of the pipes, where they tend to stick and accumulate until the electric power is turned off, after which the accumulation of dust is usually collected from the pipes by loosening it by rapping the sides of the pipes and collecting the dust in hoppers at the bottom.



Schematic Diagram of Electrical Precipitation Pipe Treater

Specialist in Insulating Materials

Mr. John T. Rowe has established himself in Montreal as a specialist in electrical insulating material. He has had a wide experience in the electrical field, having spent ten years in the designing and working out of various kinds of electrical instruments as well as nearly two years in the wireless section of the Royal Air Force. Mr. Rowe specializes in supplying the most suitable insulation from specifications and drawings of prospective electrical work and is the Canadian representative of the Imperial Porcelain Works of Trenton, N. J., and also represents the Wilmington Fibre Specialty Co. and the General Insulate Co.

Rose & O'Hearn, electrical jobbers and supplies, 220 King Street West, Toronto, have moved to 293 King Street West.

The City of Westmount has reduced the charge for electrical lighting from 5c to 4¾c per kw.h. The charge for cooking remains at 1½c. per kw.h.

Advertising Pays

A contractor-dealer out in Alberta increases his fan sales by displaying prominently each day in his window a large card bearing some such legend as the followiing:

PROBABILITIES:
Fine and Very Warm To-day and Tomorrow.
No heat prostrations where electric fans are used. Come in and get cool.

His newspaper ads. take a similar form, being always located in the same place, come in for regular inspection by the reader each morning..

The Star Electrical Vibrator

W. H. Spencer & Co. Ltd., Montreal, are distributors of the Star Electric Vibrator, manufactured by the Fitzgerald Manufacturing Co., Torrington, Conn. The vibrator, it is claimed, relieves aches and muscular fatigue that are the result of cramped or overstrained muscles and stagnated circulation.

Prepare for the Long Evenings

The longest day is nearly two months behind us and it's not too early to be planning for the long dark eveniings. This winter will see a big sale of fixtures and portable lamps which are ever growing in popularity. Perhaps the most noticeable development in house lighting is the appreciation of the fact that fixtures and portables are in reality part of the furniture of the home. It is not enough that a room should be well lighted or even artistically lighted. The fixtures, the stands, the shades should all blend with the rest of the decorations. How frequently people move their furniture around to get better effects or refurnish entirely, but how rarely do we hear of them discarding their old lighting fixtures. Here is a growing field for the retailer. Act on the assumption that yours is a part of the decoration of the home just as much as if you were selling furniture, rugs or hangings.

Lighting Eixtures are "Furniture"

The aeroplane race from the Canadian National Exhibition to New York and return during the progress of the Big Fair in August will be the first international event of its kind ever attempted. The idea behind the contest is to demonstrate the commercial feasibility of aerial transportation between Toronto, New York and intermediate points.

Tell the Public Where to Get "Service"

Wouldn't it be a good idea for electrical contractor-dealers to put on a general campaign explaining why electrical devices should be purchased from electrical men ? You don't go to a grocery store for monkey-wrenches or to a shoe store for a new hat. Why go to a hardware store for electrical equipment ? It would surely have a very beneficial effect on the whole situation if it were explained to the public that they will get more sympathetic and intelligent attention in the electrical store; that they will find there a larger and more up-to-date selection of goods; that the salesmen in electrical stores are equipped to answer any questions the consumer may care to ask about his purchase, and, finally, that electrical stores stand back of their goods and make it a strong point to see that they work satisfactorily. In the past, and at the present time, the public purchases electrical appliances from other than electrical stores simply because there has been a scarcity of such stores. An advertising campaign, including all the electrical dealers in any locality would enlighten the public tremendously, popularize electrical appliances and start lots of business going in the direction of the electrical store that is now going elsewhere.

How Overhead Expense of Contracting Varies, Depending Upon the Amount of the Work

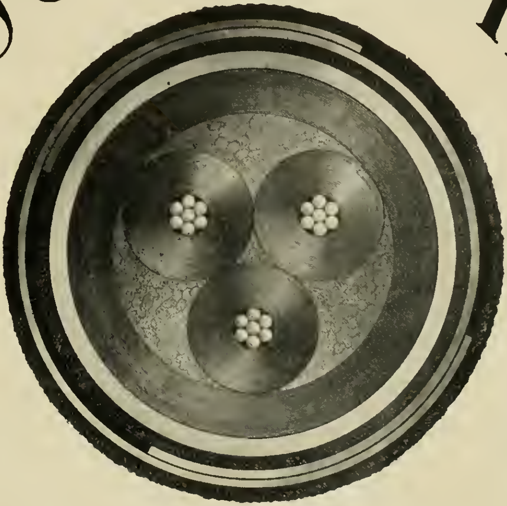
From figures compiled by the Massachusetts Association of Electrical Contractors and printed in Electrical Merchandising.

Price of Material and Labor Delivered on Job	Percentage of Overhead	Price of Material and labor Delivered on Job	Percentaeg of Overhead
$200	52.0	$2,900	25.4
250	48.5	3,000	25.0
300	46.5	3,500	23.6
350	45.3	4,000	22.5
400	44.0	4,500	21.7
450	43.0	5,000	21.0
500	42.0	5,500	20.3
550	41.2	6,000	19.7
600	40.5	6,500	19.2
650	39.8	7,000	18.7
700	39.2	7,500	18.2
750	38.5	8,000	17.8
800	37.9	8,500	17.4
850	37.4	9,000	17.0
900	36.9	9,500	16.6
950	36.4	10,000	16.2
1,000	36.0	11,000	15.5
1,100	35.0	12,000	15.0
1,200	34.2	13,000	14.7
1,300	33.4	14,000	14.5
1,400	32.7	15,000	14.3
1,500	32.0	20,000	13.2
1,600	31.3	25,000	12.2
1,700	30.7	30,000	11.5
1,800	30.1	35,000	11.0
1,900	29.5	40,000	10.8
2,000	29.0	45,000	10.6
2,100	28.5	50,000	10.4
2,200	28.0	60,000	10.0
2,300	27.6	70,000	9.6
2,400	27.2	80,000	9.3
2,500	26.8	90,000	9.1
2,600	26.4	100,000	9.0
2,700	26.0	130,000	8.7
2,800	25.7	160,000	8.5

The Walger Connector Company, Toronto, C. Jackson. agent, announce that they have changed their address from 22 College Street to 32 Front Street West. This location is not only more central but more commodious and convenient for making prompt shipments.

PHILLIPS'

ARMOURED CABLES



No. 2 B. & S. 3-Conductor 25,000 Volt Cable

Paper Insulated, Lead-covered, Double Steel Tape Armoured

Supplied to the Order of
The Quebec Railway, Light, Heat and Power Company

Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary, Vancouver

Current News and Notes

Biggar, Sask.

Work has commenced on ar
gar Electric Light and Power Co͏ectric plant for the Big-

Halifax, N. S. ʾiggar, Sask.

Earnings of the Nova Scotia Tramways an
pany for the first five months of their present fiscaver Com-
$538,565; operating expenses were $359,229. The incr were
net earnings over 1918 is $26,489. ʾn

Kitchener, Ont.

Investigation into the condition of the Waterloo and Wellington Railway Company's lines has been made by Superintendent V. S. McIntyre of the Street Railway Commission, who is to make a report to council. It is expected that the city will shortly consider the proposal of the company to sell out to it.

Mimico, Ont.

The Toronto and York Radial Co. have increased their fares for transportation up to stop 18 on the Lake Shore Road. Previously the rate was eight tickets for a quarter, but it has now been made six tickets for a quarter. Residents in the district affected are displaying some opposition to the change and at a recent meeting the following resolution was passed: "That Etobicoke Township Council be requested to call a meeting of representatives of Mimico, New Toronto, and the township itself, to interview Sir Adam Beck in regard to the franchise rights of the Mimico division (Lake Shore route) of the Toronto and York Radial Company, with a view to expropriating the said radial line, and operating it as a public utility, and to issue debentures to buy the same out."

Montreal, Que.

The Western Quebec Power Company, Limited, has been incorporated; head office, Montreal; capital stock, $1,000,000.

Oakville, Ont.

Work on the Hydro-radial survey through Oakville has been completed. Purchase of the right-of-way will commence at once and the construction work, it is understood, will not be delayed longer than a few months. When the radial is in operation it is expected there will be a half-hourly service to Yonge St., Toronto. The trip between Oakville and Toronto will be made, it is said in about halt an hour.

Ottawa, Ont.

The Battery Engineering and Supply Company, Limited, and the Continental Storage Battery, Limited, have been granted charters. The head office of both companies is at Ottawa, Ont.

The Department of Naval Service announces the inauguration of a commercial wireless service between Canada and Bermuda. It has been established between the Canadian radio telegraph station at Barrington Passage, N.S., and the British Government station at Bermuda. These stations were erected during the war for naval purposes, but will now be used for commercial work.

Perth, Ont.

The Bell Telephone Co. is doing its share in helping to improve the town by the removal of poles and overhead wires and the placing of the wires underground.

Port Colborne, Ont.

The ratepayers of Port Colborne ,Ont., recently carried a by-law authorizing the purchase of the distribution system of the Ontario Power Company in that town.

Saskatoon, Sask.

The ratepayers of Saskatoon recently voted against a proposal to operate one-man cars in that city. By-laws proposing expenditures of $156,200 for additional equipment at the power house and $35,000 for extensions to the street railway system were carried.

Bids are being received by the city of Saskatoon for a new
St. Bc: turbo-generator set.

Worse, **Man.**
for the Mauow proceeding on the new telephone exchange
Sutherland, Sask. Government telephone system.

An electric lig.
ion Forestry Farm at plant is contemplated for the Domin-
Toronto, Ont. ·therland, Sask.

The Toronto Street k.
cided to accept the terms recay Employees Union has de-
Board of Conciliation, of whichended in the report of the
The street-car men employed lge Barron is chairman.
Radial Railway Company, numberinthe Toronto and York
the Toronto Railwaymen's Union. 200, are coming into
have a membership of over 3,000, makings union will thus
in the city. the largest union

The Toronto city council will prepare a b
the double-tracking of the Bloor Street civiaw authorizing
High Park Avenue to Runnymede Road at an car line from
of $160,000. timated cost

Toronto civic car lines show an increase in
July of about 25 per cent. over last year. venue for

Moved to Larger Quarters

W. H. Spencer & Co., Ltd., electrical supp
manufacturers' agents, have removed from 340 Ues and
Street to 213 Notre Dame Street West, Montreaversity
latter premises are much more commodious than th The
iously occupied, and are in the centre of the dowe pre-
district. The company are in a position to carry n-town
larger stock, and also to make prompt shipments much
extensive line of electrical supplies. of an

Personals

Mr. Arthur B. Reynders, former Director of Proc
of the Westinghouse Electric & Manufacturing Coaction
at East Pittsburgh has recently been made Worksnpany
ager of their East Springfield plant. Man-

Mr. H. E. M. Kensit, who joined the C. E. F. ,
tember, 1915, has now returned to the Dominion Water Sep-
er Branch, Ottawa. He was attached to the Canadian Pow-
eers for two years and after being wounded on Engin-
Ridge was transferred to the Ministry of Munitions o Vimy
England, as Dilution Officer, for a further 17 months. War,
the armistice he has represented the Dominion Water Since
Branch as a member of the Water Power CommitteePower
sitting in England, i.e., that of the Conjoint Board of s now
tific Societies on water powers of the Empire, and Scien-
the Board of Trade, formed at the request of the What of
of Reconstruction, on the water power resources inistry
United Kingdom. of the

Electrical News
Generation, Transmission and Application of Electricity

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ADVERTISEMENTS

Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

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Vol. 28 Toronto, September 1, 1919 No. 17

Building Electrical Appliance Industry Without Proper Foundation

It is a waste of time and energy trying to sell a customer an article he can make no use of. Yet that, in effect, is what central stations and dealers are trying to do when they dangle before the eye of the average householder the many advantages of electric appliances. The simple fact remains that the householder couldn't use them if he had them, and generally doesn't use them when he gets them, simply because he hasn't the proper facilities.

We may as well face the situation squarely now as later on. Household appliances can never be used satisfactorily and will never be sold successfully until the homes into which these appliances go possess the necessary outlets to make the constant use of the appliances easy, safe and sightly. It is a foregone conclusion that we can never hope to establish the use of electrical appliances in the home, as a habit, utilizing lighting circuits and lighting sockets. They have a too limited capacity; they are, as ordinarly used, not safe; they are inconvenient to get at; the result is unsightly. All these things operate against the use of appliances.

We are making it difficult for people to use electricity instead of making it so easy that they are constantly tempted to do so.

The root of solution of the matter surely lies in a campaign for the installation outlets in the baseboards or elsewhere. Since it is a matter of public safety there should be no difficulty getting our building by-laws so worded that every house must have special appliance outlets; the assistance of architects should be enlisted to make the number of outlets as great as possible; the contractors should refuse to wire a house unless appliance outlets are included; the inspection department should refuse to "pass" a house that is not supplied with such outlets, and, finally, the central station should refuse to supply current unless a minimum of outlets are provided. Such an attitude may, at first, seem a little arbitrary, but the campaign of "education" is going so slowly that the whole industry is being stupidly retarded. So long as keen competition causes cutting of prices, just so long will our houses be inadequately fitted electrically. The whole matter could be settled summarily if the architect, contractor-dealer and central station would get together.

Engineers Will Take Part in Deliberations on Labor Problems

On September 15, in Ottawa, some hundred and fifty representatives of the various elements in our industrial life will meet together at the call of the Minister of Labor to discuss matters which particularly affect the relationship between employer and employee. There will be about sixty delegates each, representing labor on the one hand, and employers on the other, and in addition, there will be a sprinkling of delegates whose relation to the industrial life of the country is such as to enable them to take an impartial view of the situation, or of any argument that may be brought up on either side. Such, for example, will be the representatives of the different engineering and technical societies, for we understand that the Canadian members of the A.I.E.E., the Mining Institute, the Chemical Society and the Engineering Institute of Canada will all be represented.

This, after all, is a very proper function for the engineer and one, too, which his training and experience fit him well to fulfil. There will, doubtless, be much plain speaking on both sides at the conference and much evidence of old prejudices, but the technical men, let us hope, will be the leaven of the occasion which will leaven the whole lump.

Revised Recommendations re A. I. E. E.

The Development Committee of the American Institute of Electrical Engineers made certain recommendations at the August meeting regarding the publication of the proceedings. The committee transmits the opinion that it is an almost unanimous view that the proceedings do not now seem sufficiently to interest the members at large. It presents definite recommendations under the six headings of the original draft, namely: (1) Publication; (2) Organizations; (3) Activities; (4) Local Federation; (5) National Council; (6) Engineering Congress. The essential features of the recommendations in revised form are as follows:

Regarding publication. To enlarge the editorial and executive publication staffs in order to expand the Proceedings.

To publish additional matter of live interest and value to the membership as a whole without giving less importance to the fundamental advance in the art and to original investigation work.

To publish all Institute papers and occasional papers of unusual broad general interest from sections or other sources.

To publish a set of abstracts of every paper presented at every section.

To eliminate duplication of expense heretofore incurred by publishing papers in both the Proceedings and the Transactions without depriving members of the latter.

To increase the revenue of the Proceedings by securing more advertising and if necessary, to change the present size of its page.

To print advance copies of some or all sections and perhaps branch papers but limit their distribution.

Outlet Box Numbers Standardized—A Step in the Right Direction

The Electrical Outlet Box Section of the Associated Manufacturers of Electrical Supplies of the United States have adopted a standardized system of numbering for outlet boxes and covers. This action follows a suggestion made some time ago by the Electrical Supply Jobbers' Association that some method be devised to eliminate seven sets of catalog numbers in order to discriminate seven almost identical lines of outlet boxes and box covers. New catalog of the manufacturers will shortly be on the market bearing the new standardized catalog numbers. Hereafter a catalog number will mean a certain definite box, this number applying to the same box made by every manufacturer.

The method adopted is simple—no key to remember; no puzzles to clear up. The numbers have been so worked out that the first two numerals of the cover for a certain size and shape of box, will be the same as the first two numerals of the box itself. The box number will consist entirely of numerals. The cover will be designated by the insertion of the letter "C" after the first two numerals.

Standardization is a saving all along the line, and is becoming universal. When the new catalogs are distributed, all of the electrical trade, from the manufacturer to the wireman, will undoubtedly feel this saving. Some of the reasons which influenced the manufacturers in the standardization of box numbers follow:

1. There are at present approximately 1,500 different numbers used in designation of boxes and covers of various manufacturers. There are, however, less than 200 distinct types.

2. Each manufacturer now has his own system of numbering, although the use and general type of almost any box or cover is identical with that of several manufacturers.

3. Both contractors and jobbers, in placing orders, will rarely ever take the trouble to look up and use the numbers of the manufacturer with whom the order will be placed. This necessitates the editing of orders by either the jobber or manufacturer and must necessarily result in numerous errors. On orders received from contractors, the jobber will almost invariably substitute the numbers of such boxes as he may have in stock, if shipment is to be made from stock, for those specified on the order, or, in case direct factory shipment is to be made, forward the order as received to the manufacturer with whom he may be placing his box orders at that particular time. This is invariably done unless the purchaser insists upon the particular make of boxes specified.

4. The types and styles of boxes and covers have become so standardized as to be almost on the same basis as sizes of conduits; there is, therefore, no more reason why different numbers should be used to designate the same box as manufactured by different manufacturers than that different numbers should be used to designate the sizes of conduits.

5. With the various box manufacturers using separate numbering systems, it is now necessary for the device manufacturers to use as much space in listing the boxes or covers with which their receptacles, switches, attachment plugs, etc., may be used as to list the articles themselves. This is also applicable inversely; about as much space is used in the catalogs of the box manufacturers in listing the devices as in listing the boxes and covers themselves. Then, again, it is the almost universal custom of the various box manufacturers to list the corresponding numbers of competing manufacturers. To do this requires additional space.

6. For the box manufacturers to furnish the device manufacturers with the necessary data for a proper listing, involves an enormous amount of detailed research work by the design, engineering and drafting departments of each; also voluminous correspondence. Errors are frequent. Both labor and errors could therefore be reduced to a minimum through a standardization of numbers.

7. For the various manufacturers to adopt a standard set of numbers would effect a considerable economy in catalog costs, and, in addition, reduce the volume of jobbers' catalogs. Take the sheets issued by the N.E.S.J.A.; separate sheets are now issued by this association, to show the lines of the several manufacturers. By the adoption of a standard set of numbers, these could be consolidated, and one set of sheets used to show the lines of all manufacturers. This would reduce the volume of the association catalog by from 100 to 200 pages. Same would apply to the National Electrical Contractors' Association Data Sheets.

8. The reduction in the volume of sheets would be particularly appreciated by jobbers' salesmen, as it would considerably reduce the weight of the catalog which they have to carry.

9. A jobber, in getting out a new catalog would feel no hesitancy in listing a standard set of numbers, cuts, etc., for he could so list and place his orders with any manufacturer; at the present time jobbers are frequently carrying the listing of one manufacturer's line and furnishing boxes of some other manufacturer.

10. Separate numbering systems, as now used, give recognition to substitute, which, at best, is a bad practice, and not to be encouraged. If encouraged in one line, as at present in the outlet box line, leeway is allowed for substitution in all lines.

11. The adoption of a standard numbering system would prove educational to all in the electrical business, for contractors, salesmen, wiremen, clerks, etc., would soon become familiar with any system adopted, and know that an XYZ box was a box of a particular type and for a certain use. With so many different numbers, as is now the case, this is impossible.

12. While some advantage might now accrue to the various manufacturers through familiarity of portions of the trade with their own "pet" numbers, the adaption of a standard set of numbers would prove reciprocal, and each manufacturer would benefit in about the same proportion.

13. The adoption of a standard set of numbers would in no way interfere with the various manufacturers playing up the strong points of their own lines, such as finish, detailed construction, materials used in manufacture, etc. As a matter of fact, these features could be emphasized more than is now possible. In ordering, contractor, if he wanted some particular make of box, could specify by giving the name or brand and then list the standard numbers desired. As indicated in a previous paragraph, this would reduce substitution to a minimum, eliminate frequent errors, etc. If no particular brand was specified, jobber would, of course, understand that no preference existed, and could ship from his stock or place order for direct shipment with his preference of manufacturers.

The first meeting of the Electric Club of Toronto will be held on Sept. 19. Brig.-General C. H. Mitchell, C.M.G., will be the Club's guest on that occasion.

Boiler Room Economy in Small Plants

By M. B. Watson, M.E.[*]

The cost of fuel and freight rates on fuel in the last few years have risen to such proportions that it is more than ever important to check up the small as well as the large losses and wastages in our fuel accounts.

This checking up has been carried on for a number of years in the larger plants, but in these plants the operating staff is generally large enough for each man to have only one part of the plant to attend to, and conditions can be kept more nearly constant. Also the whole plant is usually under the general supervision of a technical engineer who's duty it is to study all operating conditions in the plant, and to direct the work of the different operators in such a way that losses can be cut down to the lowest possible point. In such plants one usually finds the best types of mechanical stokers, fuel economizers, etc., which give added efficiency to the plant.

In the small boiler plant, it would not always pay the owners to install expensive mechanical devices and the care and operation of the plant is left to one or two practical engineers or firemen. It is thus of great importance that these men should study and apply methods of operating which will give the owner the most value in power or heat generated for the amount of fuel burned.

There are numerous ways in which leaks in boiler room efficiency can be checked up and remedied, but general operaating efficiency can not be checked up without systematic records. These records should be intelligible to the owner or manager of the plant as well as to the operators, because it gives the manager an opportunity of comparing the value of his different operators as well as that of the different kinds of fuel used, etc.

The simplest form of records of this kind should show the quantity of fuel used and the quantity of water converted into steam. This necessitates the weighing or measuring of both fuel and water. This should not, however, be impossible, even in very small plants; for instance if the fuel is brought to the boiler room in trucks, the average of the weights of a number of trucks could be found by weighing, afterwards it will be necessary to keep count only of the number of trucks used per day, or per hour as the case may be. A number of trucks should be weighed periodically, as different men may fill the trucks to different levels, or the same man may increase or decrease his filling gradually and unnoticably. The measurement of the water is of course rendered more difficult at times . Engineers should encourage owners to provide some kind of measuring device for their boiler feed water. If a pump is used for feeding the boiler a counter can be installed and knowing the bore and stroke of the pump, it would be simple to calculate the amount of water pumped for any known number of strokes. Of course, the ideal method of measuring boiler feed water is by means of an integrating water meter in the feed water line reading directly in gallons or pounds. Where boilers are fed by injectors, some kind of test would have to be made on the injector to determine the amount of water fed to the boiler at different steam pressures in a definite length of time. Then only records of the length of time the injector was working and the steam pressure need be recorded to be able to determine the amount of water fed to the boiler. A little ingenuity on the part of the engineer will easily surmount any difficulty of this kind.

In making calculations from these records, due allowance should be made for water not converted into steam, but used for blowing out the sediment, etc. The amount of water used in this way can be easily determined, near enough for practical purposes, for example: When the plant is not operating, note the steam pressure and mark the height of the water in the gauge glass, open the blow-off cock wide for the required length of time, noting the exact number of seconds. Then start the feed pump and raise the water in the boiler to its original level, measuring the amount of water required. If possible, while making this test, operate the pump from another boiler, otherwise water in the form of steam is being drawn from the boiler. If necessary to use the same boiler, condense and measure the exhaust steam from the pump, and subtract this amount from the water pumped into the boiler, to determine the amount blown out.

The amount of water blown from the boiler during a definite length of time is thus easily calculated, if steam is at the correct pressure. Of course this can be continued and the blow-off for different pressures found.

All the water pumped into the boiler, except that drawn off, is converted into steam, and in this way records can be made to show just how many pounds of water are converted into steam.

This method may be still further refined by making allowance for the heat added by the fuel to the water which is drawn off. For example, suppose normal steam pressure to be 125 lbs. per sq. in. gauge pressure and that the normal feed water temperature is 180 degrees F. Any good steam engineering text book will show that the temperature of saturated steam at this pressure, and therefore the temperature of the water in the boiler is about 353 degrees F. The water table in the same book will show that the total heat content of water at 180 degrees F. is about 148 heat units, or B.t.u's., per pound of water above 32 degrees F. also 325 B.t.u's. above water at 32 degrees F. Thus in raising one pound of water from 180 degrees to 353 degrees F. the heat delivered to the water is about 325-148=177 B.t.u's. The steam table will show that the heat content of saturated steam at 125 pounds gauge pressure, or at 353 degrees F. is about 1192 B.t.u's., above water at 32 degrees F. Therefore to raise one pound of water from 180 degrees F. to steam at 125 pounds gauge pressure requires about 1192-148=1044 B.t.u's. Thus we see that one pound of water blown off under these conditions has received enough heat to make 177/1044=0.17 pounds of steam. Therefore if, say, 1000 pounds of water were blown off, the heat wasted is equivalent to 1000x0.17=170 pounds of water converted into steam. Therefore, in making calculations from the above results to find the heating value of the fuel we should count this extra 170 pounds of steam as having been generated and used.

Records, such as the above, should preferably be kept on engine and boiler room log sheets, either daily or weekly, depending on the amount of information to be entered thereon. Log sheets can be made as simple or as complete as required, but engineers or others should beware of having a lot of entries made which can not be used by the head of the plant for some useful purpose. Only entries which will be of use in determining the efficiency of the plant or the operators should be provided for.

Chief engineers, or managers, should study these log sheets carefully, as by this means they can ascertain which of the firemen are most efficient, also they can get valuable information as to the relative value of different kinds of fuel, oil, etc. In this connection the chief engineer or the manager should not fail to express their recognition of good work on the part of any employees, this recognition may be only verbal, or may take a more tangible form. Expression of this kind are far more effective as an incentive to the whole staff to do as well as the best than are complaints of careless or inefficient work. The man who is striving to make a good showing for himself does much better work and is much more reliable than one who is being driven to reach a certain standard.

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Forty to Forty-five Per Cent. Loss

In the average small boiler plant from 55 to 60 per cent. of the heat of the coal fired is used in generating steam, the remainder of the heat being lost in about the following proportions: 35 per cent. of the heat lost in high temperature chimney gases are, however, controllable to a great extent faces and furnace walls, 4 per cent. of the unburned coal falling into ash pit.

The second of the above losses, radiation from boiler and furnace walls, is seldom under the control of the operators, in plants already installed, except in so far as proper maintenance of the settings, walls, insulated headers, drums, etc., can be carried out.

The amount of unburned coal falling through the grates into the ash pit, and the losses through high temperature chimney gases are, however, controlable to a great extent by the firemen.

The loss occasioned by the presence of unburned coal in the ash is not very likely to amount to serious proportions, because it becomes very evident. For example, suppose the grade of coal in use contains 10 per cent. of ash, and the amount of unburned coal passing through the grates amounts to 5 per cent. of the quantity fired. The residue in the ash pit contains almost half as much coal as ash, or one third of the whole is coal, which condition, being noticeable to the eye will attract the attention of the fireman, and if he does not remedy this condition the chief engineer or the manager will notice it and will demand more careful firing.

The reasons for the presence of unburned coal in the pit are too thin a fire, uneven firing, too frequent poking and slicing. The remedies are keep a thick body of fire on the grates, fire lightly and more frequently, in this way holes do not burn out in the fire and the freshly fired coal does not fall through the grates; also there is less tendency for the coal to form clinkers thus necessitating less poking, which of itself tends more than anything else to the formation of clinkers. If clinkers do not form the fires need cleaning less frequently thus saving a great deal of labor as well as coal. If the cleaning of the fires is not properly done considerable unburned coal is drawn from the furnace with the clinker and ashes. If after cleaning there is insufficient live fuel to cover the grates completely, some of the fresh coal will drop through to the ash pit. Before cleaning see that there is plenty of clean burning coal that can be left to cover the grates completely before building up the new fire. Fires should be cleaned as seldom as possible, as some coal is unavoidably thrown out with every cleaning. It should only be done when there is small or no load on the boilers. If heavy firing is commenced immediately after cleaning clinkers tend to form, while this tendency can be greatly overcome by building up the fires gradually with small and frequent firings.

A day's run should always be started with a freshly cleaned fire built gradually to full steaming capacity, and it will be found that fewer cleanings are necessary with fires operated in this way.

Before one can appreciate the losses due to the chimney gases, the principles underlying the combustion of fuel must be more or less understood. Since bituminous coal is the most commonly used fuel for steam purposes, we will direct our attention to it only, although the general principles are the same for all fuels.

When coal is first thrown on a hot fire the immediate effect is to reduce the supply of heat going to the boiler, as this heat is used to heat up the fresh coal; thus if heavy firings are added it may interfere seriously with the constant supply of steam. As the fresh coal heats up, various combustible gases are driven off generally accompanied by pure carbon in the form of soot or dense black smoke. If the temperature is high enough and there is enough air present in the combustion chamber, these gases and the soot will burn, giving the bright flame seen over the bed of fuel. If insufficient air is present, only the more readily combustible gases will burn, leaving black smoke and other unburned gases to pass out the chimney. Unfortunately the heating value of the more readily combustible gases is much less than that of the other gases and when this condition occurs we are wasting the best part of the gaseous fuel. Some of the gases under these conditions are only partly burned forming a gas known as Carbon Monoxide, in the formation of which only a small part of the heat of total combusion is given off.

After the fuel has been on the fire a few minutes the gases are all driven off leaving coke which is a solid containing only pure carbon and ash. Since this coke burns in place on the grates there is now no necessity for air above the bed of fuel as there was when the gaseous products were being driven off.

Thus we see that we have two different conditions to deal with after each firing, as well as all the intermediate conditions. First we need air coming up through the grate bars to burn the coke on the grates, also we need air above the bed of fuel to burn the gases expelled from the coal. Gradually the combustible gas above the fuel becomes less thus requiring less air above the fuel until the gases are all burned and we need only sufficient air coming through the grate bars to complete the combustion of the coke.

In general a certain amount of air is admitted to the combustion chamber above the fuel bed through circular dampers in the fire doors. This rush of air also assists in keeping the fire doors cool thus preventing them burning. A certain amount of air is sure to leak in around the cracks in the setting, or between the boiler shell and setting, or around the fire doors.

In most hand fired plants it will be found that immediately after firing there is not nearly enough air above the grates, as only a limited amount will come up through the fire bed insufficient to burn both the coke and the gases and only a small amount leaks through the fire doors, etc. We thus get black smoke being discharged through the stack at intervals in most hand fired plants which shows incomplete combustion and consequently a waste of fuel. After the combustible gases have burned off, the same amount of air is still leaking around the doors, etc., but this extra air is not needed and does not help the combustion of the solid fuel. This air serves only to cool the products of combustion, thus passing cooler gases over the heating surfaces of the boiler from which less heat will be delivered to the water or steam. Thus we find a great waste in heating this extra air not needed for combustion.

These two conditions as described above can be more nearly equalized by frequent and light firing. In this manner there will not be a very great deal of combustible gas driven off at once and it will probably get enough air to more nearly complete the combustion, also by the time this gas is mostly all burned and the fire getting too much air it will be time for another firing, so that neither of the extreme conditions rise to serious proportions, nor do they last for great lengths of time. The ideal conditions are most nearly obtained in the constant feed types of mechanical stokers.

(Concluded in September 15 issue)

Success Electrically, Depends Upon Unity of Action

An Eloquent Exposition of the Essential Attitude of Mind, Alike in War and Peace, of a Progressive, Successful People

By Mr. A. Monro Grier, K. C.*

First of all permit me to congratulate you, sirs, upon having your convention held in what is now the historic Clifton Hotel. I had to do with the company which was the predecessor of the one now responsible for conducting this establishment, and I would like, as one who has passed from that, to pay my compliment to those who are responsible for it at the present time and to wish them, as doubtless you do with me, every success in their enterprise. Of course, in making that remark I impress in my thought at least, if not in my language, the actual meal we have eaten. I lay claim at times to certain spiritual tendencies, but I am not so spiritually minded as not to have a proper regard for the dictates of the stomach, and I must say I have enjoyed the meal, and have not found it, as I have found many other banquets, so meagre that I was glad to get home to get some nutriment.

I am reminded once more of that occasion when the Right Honorable Joseph Chamberlain was to speak at a certain dinner in England, and the mayor, presiding with rather more geniality than tact, said to the Right Honorable gentleman: "Will you begin now or shall I let them enjoy themselves a little longer."

Now I am getting started. I want to commence, if I may, by issuing a word of welcome to you all, and in case that should seem a very conceited utterance, since you are my hosts and I am your guest, let me say at once that I allude to the district of Niagara Falls, and it is not unbecoming that I should speak in the language of one welcoming you under the circumstances. For several years my interests have laid in Niagara Falls. In Toronto I have a legal interest. I have two lines of defence. If any man comes to me with a legal proposition and says "Look here, solve that," I say "My dear fellow, I am engaged in the electrical development work," and if an electrical man comes and says "I wish you would explain this technical difficulty," I say "My dear sir, I am a K. C."

I desire, as one connected with the company for a great many years, to extend a very hearty welcome. I do not use such a word as "Opposition Camp," but there have been different points of view by different bodies of men connected with the electrical industry in Ontario. I come to you to-night not as one in any sense hostile, but as one distinctly friendly and one whose attitude is that everything must be well, because it is always fair weather when good fellows get together.

It is not unbecoming on this occasion for me to mention that I have the honor of addressing you as president of the Niagara Power Company, and also as president of the Canadian Electrical Association, and in both capacities I bid you welcome. If in these official capacities that is my attitude, what shall I say of my own—individually? This: That if by any chance there lies in me any modicum or residuum of ill-feeling or a lack of friendship officially, there is not one iota of that from my individual standpoint, and as A. Monro Grier I bid you hearty welcome to Niagara Falls.

Now, you may perhaps be wondering what I am going to say to you to-night, and I have resolved my doubts to a certain extent, and so that I may not forget them all I have noted them roughly on a piece of paper to which, with your permission, I will refer from time to time. It may be that some of you expect me to speak technically. That I shall not do. I have but one object, or perhaps two: First of all, speaking of you collectively, this, that your association may grow and prosper, and anything I to-night may say will help to its growth and prosperity and not retard it; that is of you collectively. Individually, my hope is this, that I, speaking as an older man to you all—certainly to most of you—may perchance say something which will be of assistance either in your business or in your private life. Not that I shall enquire into your official or private lives, but I shall hope that by reason of some years of reflection of life and its philosophy, something may have demonstrated itself to me as useful which I, in turn, may have the honor of passing on to you. And so I thought I would say something to you to-night in the way of inspiration. It has occurred to me that at this juncture in our country's history, and in the history of the world we must look for inspiration, for undoubtedly we have reached times that are hard and difficult from certain points of view. What inspiration can I communicate to you? You will be here for some days. What will you see when you are here? I charge you that you will get all the inspiration you should get from the works and wonders of Nature that you shall see. I am intolerant of the man who, coming to such a place as Niagara Falls, leaves it no wiser than when he came. It is the bounden duty of us all to gather something from the wonders around us and to enrich our lives therewith. What will you find, not alone in Niagara Falls, but also in the history largely of the world as written on the rocks which compose the boundaries of the river just below our seats? What may we not learn there as to the ages of the earth, and not only that, but of the patience of Nature in the things she accomplishes. What will you learn of all that has taken place between the time these falls rushed over the Queenston escarpment until by process of erosion they reached their present site. If you visit the Niagara Glen you will find now overgrown with trees, the veritable bottom of the river in an older age. And the lesson, as I conceive it, to be learned by all of us from regarding such matters as these, is something of the majesty of philosophy, the majesty of calm in storm, the majesty of repose when things are apparently against us, the majesty of patience in the working out of things not in a few passing moments or years, but down through the centuries. And if, perchance, at any time in your lives it may seem that things are not going as smoothly or as quickly as they should, that you are not reaching the goal before you as expeditiously as you desire, say to yourselves this,—and in so saying you will render me my greatest thanks—"On the 19th day of June, 1919, a speaker, laying no claim to merit as a speaker, yet suggesting that there was some merit in the thought, stated that you could have in matters of life such a splendid repose and patience as to make the passing ills of the day seem as nothing, and make you really bigger and better men." I really must be careful that I do not lay myself open to the charge of having uttered a lay sermon. Please understand that I am not doing anything of the sort. I am speaking to you from a lower plane, or certainly one no higher than your own. I am speaking to you as one man to others, and uttering a few passing thoughts which conceivably will be of use and interest to you.

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*President Canadian Niagara Power Company; president Canadian Electrical Association, before Niagara Falls Convention of Ontario Municipal Electrical Engineers

Now, what do you see here of the works of man, the completed work of electrical development? As I have played for eighteen years a part of some importance in that development, it is obviously of good taste that I say nothing about it. I only suggest that it is perhaps a matter of inspiration to you to see what has been accomplished already in the harnessing of Niagara. I understand that on Saturday you will visit the work now in progress between Chippewa and Queenston, and I have no doubt you will marvel with me at the size of the undertaking and the magnitude of the conception of the plan, and speculate as to its final result. But I will not keep you with details as to that. I daresay in any event that each and all of you are better able to judge of such a matter than I am, but I make this remark, that as representing the interests I do I have no attitude of hostility towards anything that is for the good of the province or the country, but am absolutely in favor of everything that is for the real benefit of the province or of the country at large.

Now, I am going to speak of another inspiration which is not of to-day, but certainly was of yesterday, and, in a sense, is still of to-day, because only an armistice, and not a peace, has been signed. If you say to me: "we have heard enough of the war," I say to you: "in certain ways we can never hear enough of the war." I am not going to give you a history of the matter. I simply let you know my purpose in advance, so that if I fail you may see how greatly I fail. I suggest this thought to you, that the old adage of "unity is strength" is being fulfilled over and over again, and perhaps in this country has been fulfilled more than ever before in the history of the world, and that in this thought there lies a truth that the duty of man is to do his own work, and if we do our own work and recognize the value of unity there is no question of the future success of this or any other association. What shall we choose from the war from which to derive inspiration? I point out to you the unity of the empire itself. You remember the time when Germany, amongst the idiotic things she did think, thought that the "colonies," as they were called, would not come to the aid of the old country. Fool! What happened? Before the official declaration of war had been made Canada offered her aid to England in the great war for freedom and the liberty of man. And they trooped from everywhere, from Australia, New Zealand, Africa, from the uttermost parts of the earth, and the outlying parts of the empire, including the Boer chief and others under him! Mark the difference! In 1870, forty-four years before this present war broke out, Germany had conquered Alsace-Lorraine, and yet, in 1914, there was a bitterness and a hostility towards Germany, on the part of the Alsatians, that nearly half a century had failed to eliminate. In the case of the Boers, however, with whom England had been at war just a few short years before, what did we find? They allied themselves with the old country and their attitude was one of comradeship, of friendship. In truth, the fact is that these bonds which bind the various portions of the empire together, which are so thin you cannot touch, you cannot handle, you cannot see, these things which are so fine materially, spiritually are so strong that not the steel of the greatest strength can by any possibility attain to their coherence.

We had a unity not only amongst the nations composing the Empire, but amongst the several branches of the service, and I want to allude to this here because I understand that members of this association and their relatives went overseas. In fact, there is no household in Canada or any part of the British Empire to-day that has not had some association, through their relatives, with this war. And just for a moment let us see the extraordinary unity that prevailed amongst all ranks and all branches of the service. The army fought cheefully with the navy, and both cheerfully with the air service, and with them all co-operated the women of the empire in their several places, all with one object in view—absolute unity. It mattered not one whit what was the religion of any man, how high he was amongst the officers, or how low he was in the ranks, all were the same, whether in the army, the navy, the air force, or elsewhere. And not only were the official soldiers and sailors fighting, but we had that tremendous navy of fishermen who, hitherto devoted to peaceful pursuits, abandoned them in order that they might carry on for the Empire and for freedom, all showing the marvel and beauty of unity. Can you imagine any finer situation amongst the Allies than their voluntary subordination to that magnificent French officer, General Foch? Careless of their own particular standing, all united under him in order to win the battle.

Then, look at the wonderful co-operation in the navy. You remember how the American navy went forward and co-operated with the British navy, the officers and men subordinating themselves to the ranking British Admiral. Why? Because they were not concerned with showing their own individual exploits, but with proving to the world that the Hun was an abominable beast and that Germany could not rule the world and that freedom must.

Now, let us glance at our own problems, and ascertain, if we can, what is best for us in these trying times. Peace and good-will was that splendid message of old, and peace, I trust, we shall shortly have, and now to get the good-will! That is really the important thing in all our activities in life. If you get enough men of good-will banded together they can accomplish anything for good. For myself, though I admit my obscurity, I do claim I have good-will, and if I meet any man, I care not of what rank, or camp, or association or interest he is, provided always he is a man of good-will, I shake hands heartily and wish him God speed in any venture he has for good. And this should be the attitude of us all. Your action to-night demonstrates that it is possible to have one from another interest speak to you in a voice not unfriendly, but in such a way as to suggest that he was one of yourselves. So I charge you to give me the thanks of bearing in mind just the outlines of what I have said. Please remember more than ever the vast wonder and splendour of unity. Sometimes when I walk into a great powerhouse and contemplate the majesty of a generator (which is obvious to you) and think of the little things in the wheel-pit (which I and some of us present know about) I reflect on how we all see the things of splendour and ignore the humbler. Yet the generator is dependent on the little things in the wheel-pit, and were the small things in the wheel-pit to say "I shall no longer act as a wheel bolt or nut, but would rather be a generator," and attempt to carry out its desire, it would show it was an uncommonly bad nut or bolt—that is something we have to learn.

Contemplate for a moment such a majestic character as Abraham Lincoln. Some people have the notion that the great point of his life is to demonstrate that a man of obscure beginnings can become President of the United States. That, perhaps, incidentally is taught, but it is not the main lesson. The main lesson of his life is that whether a farmer or an obscure lawyer in a western town, in each and every position we must do our duty, and it is on that account that after the lapse of so many years the world still rings with the applause of that tremendous, splendid man.

I am very much concerned about getting this simple lay message directly into your consciousness, but I daresay you feel it is quite time I concluded, and I think so too, and I am going to obey the injunction of someone who said to a man who did a great deal of public speaking: "When you have finished sit down quietly lest you awake the sleepers." Just bear that thought in mind as to each doing his duty. May I give you an illustration as to unity? Perhaps you have heard this before, but it is worth hearing again. Do you ever have in your mind what is causing this light to shine, these electric street cars to run, these electro-chemical places over the river to do the wonderful work they do? May I give you an illustration as to unity? Perhaps you played a greater and more significant part in the war than Niagara Falls, because we were sending such a tremendous amount of stuff to Europe for the allied armies). Why is Toronto and all of the province engaged in vast manufactures? Simply because a certain number of individual drops of water are falling down a certain given space. That is the whole thing. I ask you to consider what would be the effect if you drop one drop of water to-day and another drop to-morrow and another the next day Absolutely no effect. The effect is wholly produced by means of unity. By the drops falling down together, and in that we get probably the most majestic conception of man's handiwork to be found in the civilized world.

In conclusion, let me quote Tennyson's beautiful lines written to the late Queen Victoria during her reign, and let me suggest that we apply the spirit of the language to our own councils and thus secure better results:

"And statesmen at her council met
 Who knew the seasons when to take
 Occasion by the hand, and make
The bounds of freedom wider yet.

"By shaping some august decree,
 Which kept her throne unshaken still,
 Broad-based upon her people's will,
And compass'd by the inviolate sea."

Efficiency Engineering in the Electrical Industry

Capital Cost of Improvements Saved in Two Months' Operation

By Mr. A. L. Mudge*

The following are typical examples of improvements in electric light and power systems in large industrial establishments, and indicate the possibilities of what may be accomplished in many other cases.

I. Reduced Power Bill $3,000 per Annum

A manufacturer using about 400 h.p. was penalized by the power company on account of low power-factor. The power consumption of every motor in the plant was tested and many motors were found to be too large. Several motors were loaded to less than 20 per cent. of their rated capacity. Drives were re-arranged, four motors released—and sold for more than enough to pay total cost of changes, and annual power bill was reduced by $3,000.00. Further, a goodly portion of the power company's stations, transformers, and lines was released to carry other important war demands for power at a time when such capacity was very badly needed.

II. Two Months' Savings Paid Capital Cost.

A manufacturer in Toronto with motor installation of 3000 h.p. was using about 1400 h.p. supplied from sub-station three-quarters of a mile away at 550 volts. Due to war conditions, load had grown very rapidly till there was a loss of about 400 h.p. in line and an excessive voltage drop frequently to below 450 volts, as shown by the inner curves in the accompanying chart.

This caused the following conditions in factory:

1. Motors would overload and heat excessively, making it necessary to shut down for cooling and repairs.

2. Motor fuses would blow and shut down motors.

3. Main circuit breaker would open and shut down entire factory one or more times a day, leaving 1,500 men idle.

4. Motor load going off caused excessive voltage rise. In one day this resulted in burning out $64.00 worth of lamps.

5. The switching arrangements at the centre of distribution were also very inadequate and dangerous.

The work done consisted of:

1. Examining entire electric power system of factory making tests of power consumption, power-factor, etc.

2. Making analysis of power bills and operating conditions.

3. Negotiations of new contract with power company.

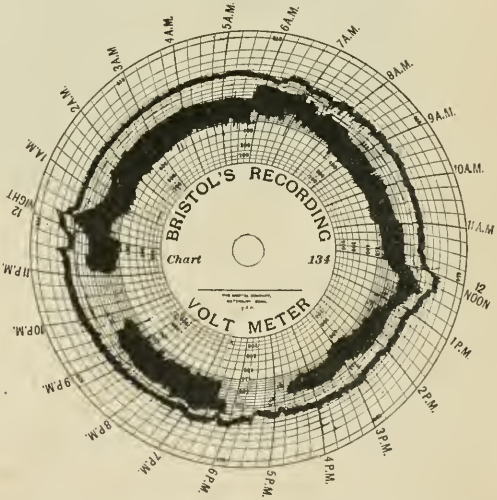
4. Design and construction of 2,000 h.p. sub-station at factory, to which, under the new contract, power company delivered power at 12,000 volts. The power company was able to loan transformers to the manufacturer on account of transformer capacity released due to the changes.

5. Purchase and installation of new 8-panel distributing switchboard.

6. All change-overs were made during usual week-end and holiday shut downs, causing no interruption to production.

The results obtained were:

1. Continuous service at steady normal votlage; see outer curve in the accompanying figure. This means the elimination of all the trouble referred to above, and gave an increased production of many thousands of dollars per month. It is interesting to note that with an average closely regulated voltage of 600 at sub-station, instead of 500 volts badly regulated, motor speeds will be 2 per cent. higher, givng both increased production and better quality of work on account of higher and steadier speed.



Voltage curves—Inner, unregulated; outer, higher and better regulated

2. Safe and satisfactory handling of load through new switchboard with ample provision for extensions in future.

3. Entire capital construction cost comparatively small, being less than amount of the savings which resulted during the first two months following change-over.

4. Practically all of the 400 h.p. line loss was released for use elsewhere when war demand for power was very heavy

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*Consulting Engineer with Kerry & Chace, Limited, Toronto.

The Contractor-Dealer

Declaration of Principles to Guide Electrical Contractor-Dealers

The members of the National Electrical Contractors Association in their Milwaukee Convention approved a "Declaration of Principles," as follows, which recognizes the necessity of establishing closer working relationship between the various elements in the electrical trade, and between employer and employee in that trade:

Principles

1. The facilities of the electrical industry for service to the public will be developed and enhanced by recognizing that the overlapping of the functions of the various groups in the industry is wasteful and should be eliminated.

2. Close contact and a mutually sympathetic interest between employee and employer will develop a better working system, which will tend constantly to stimulate production, while improving the relationship between employee, employer and the community.

3. Strikes and lock-outs are detrimental to the interests, alike of employee, employer and the public and should be avoided.

4. Agreements or understandings which are designed to obstruct directly or indirectly the free development of trade, or to secure to special groups special privileges and advantages, are subversive of the public interest and cancel the doctrine of equality of rights and opportunity, and should be condemned.

5. The public interest is conserved, hazard to life and property is reduced, and standards of work are improved by fixing an adequate minimum of qualifications in knowledge and experience as a requirement precedent to the right of an individual to engage in the electrical construction industry, and by the rigid inspection of electrical work, old and new.

6. Public welfare, as well as the interest of the trade demands that electrical work be done by the electrical industry.

7. Co-operation between employee and employer acquires constructive power, as both employees and employers become more completely organized.

8. The right of employees and employers in local groups to establish local wage scales and local working rules is recognized, and nothing herein is to be construed as infringing that right.

Two Dollars or Six Dollars per Outlet?—Cost of Wiring Old Houses Always Uncertain

Some interesting figures were recently gathered by the Housing Committete of the National Association of Electrical Contractors covering the cost of old house wiring. Eighty-four replies were received from the questionaire sent out from which it appears that the cost ranges from $2 per outlet to $5.25 per outlet. In a recent job in Toronto the net cost ran approximately $6 per outlet, including service for an electric range. The figure of $6 was worked out with painstaking care and accuracy and demonstrates beyond question that the contractors who figure at $2 or $3 an outlet have no chance in the world of making a decent living. The biggest factor of uncertainty is labor. You never can do more than guess before hand what obstacles will be met. It is all the more necessary then that you have accurate data on part work.

In commenting upon the situation the Committee remark that "Many contractors have no systematic method of estimating house wiring; either a back of an envelope or a business card is considered sufficient for estimating any job. The committee recommended unit price estimating on a form which gives sufficient space to properly note each room, outlet, switch, plug, etc., and allows less opportunity for omitting necessary parts of the estimate, which usually results in a loss to the contractor dealer.

"Your committee further recommends that not less than 50 per cent. profit be added to the net cost of labor and material on any house-wiring installation below $300 for the reason that the overhead on this class of work is higher than store, industrial lighting or power installations. The average time required to wire a three-storey house will take from five to fifteen days; the cost of the material is about 40 per cent. of the total cost of the work, labor representing the balance, so that the time necessary to install this class of work is of such duration that it is necessary to charge a larger percentage of profit to cover the increased overhead.

"In all house wiring jobs the committee suggests that only the best materials be used, and recommends to the owners that switches add to the convenience of the installation and should be placed for any important room. Do not place the control of electricity in the same class as the old-fashioned gas jet. And now regarding outlets; study the requirements of each room and suggest to the customers the advantage of having a number of these outlets placed throughout the house; the average customer having electricity installed for the first time, is not familiar with these conveniences, and the contractor-dealer is the one to urge the installation of the same.

"The committee further recommend that the contractor-dealer advertise more freely, and conduct intensive campaigns, during the spring and fall, to be followed up by active solicitation at all times."

Selling "Sight Unseen"

Here is a plan which a dealer in a small California city has found effective as a means of keeping trade from going to mail order houses.

When he started to sell Westinghouse irons one of the first things he did was to order a $5.50 "mail order" iron.

In due time the box containing the iron arrived. The dealer, however, did not open it. Not a string was untied or a seal broken, and the box was left on the counter near his own stock of irons. When customers began dickering over the prices of the Westinghouse iron and mentioned, in contrast, the price of the mail order iron, he was ready for them.

"Why," asked one lady, "should I pay you $7.00 for an iron when I can send east and get a Stands Anywhere iron for $5.50 ?"

"Oh, you want the 'Stands Anywhere' iron, do you " responded the dealer. "Well, I carry that, too. I'll be glad to sell it to you."

"Where is it? Let's have a look at it," answered the lady.

"It's right there in that box," said the dealer.

"Open it up. Let me see whether I want it or not."

"No," said the dealer. "It will stay in that box 'til it's sold. Isn't that exactly the way you buy from the mail order houses? Don't you pay your money before you ever open the box? I'll sell the iron to you on the same terms. That's fair, isn't it?"

The prospect saw the point. This incident has happened a good man times since. The box is still unopened. But it has proved as profitable an investment as the merchant has made in a long time.—Electrical Contractor Dealer.

Northern Electric Power & Light Sales Convention

A very successful convention of Northern Electric power and light dealers for western Ontario was held at the Tecumseh Hotel, London, August 12th and 13th. This convention was attended by over twenty dealers and their representatives. Afternoon and evening sessions were held on Tuesday, and forenoon session on Wednesday. On Wednesday afternoon the dealers inspected the Northern Electric Company's London branch and a photograph was taken of the delegates.

Flooding the country-side with power and light. Northern Electric Co.'s agents in convention at London, Ont.

Mr. B. L. Baulch, manager of the London branch, welcomed the delegates to London and explained the object of the convention. Mr. T. R. Campbell, power and light sales specialist, from the company's head office at Montreal, outlined the line of power and light plants and accessories which the company is marketing through its dealer organization. He answered a number of questions relating to the operation of the different plants and devices. Mr. G. H. Nablo, of the Matthews Engineering Company, Sandusky, Ohio, outlined the policy of his company and gave some very interesting details regarding the different types of automatic, semi-automatic and hand-controlled plants which they manufacture at their factory. Mr. Nablo also described briefly what his company had done to supply the U. S. Shipping Board with 6 kw. automatic plants for use on transports, for emergency lighting, and to supply current for wireless in case the main power plant should be put out of operation. Mr. P. O. Roberts, power and light specialist of the Montreal office, read a paper prepared by Mr. T. N. White, sales engineer and manager of service department, on "Service and Installation." This paper outlined the company's policy on service, which is very comprehensive. A paper was also read by Mr. W. P. Tice, of the company's accessory sales department, on the subject of accessories for use with Northern Electric power and light plants. The company markets through its dealers a broad range of accessories to lighten labor on the farm. Mr. C. L. McMullin, sales manager of the Fuller-Johnston Engine Company, of Madison, Wis., gave a very interesting and instructive talk on gasoline engines. The Fuller-Johnston model "K" engine, which the Northern Electric Company has adopted for use with their belted type plants, has been specially designed for this purpose and has proven reliable for such service. The dealers and representatives of the different manufacturers and of the Northern Electric Company dined together in the evening at the Tecumseh House.

After dinner Mr. J. Astram, of the Fort Wayne Engineering & Mfg. Co., Fort Wayne, Indiana, gave a most instructive talk on the well-known line of Paul pumps which are being distributed throughout Canada by the Northern Electric Company. Mr. D. M. Simpson, manager of the Chicago office of the General Lead Batteries Company, described the theory, operation and care of storage batteries, accompanied by lantern slides. This talk was presented in such a way that the dealers realized that storage batteries are not so mysterious as is generally conceded.

On Wednesday morning Mr. Campbell presented a very interesting paper, "Northern Electric Company and the Dealer." Some interesting extracts from this paper were published in our last issue. After Mr. Campbell's paper, over an hour was spent in open discussion of points of interest to the dealers. Many interesting experiences were related by different dealers and suggestions exchanged which will assist in the sale of power and light equipment. Mr. McMullin gave a very live talk on "Selling the Farmer," which abounded with interesting anecdotes and experiences. Many suggestions were offered as to how a dealer could more intelligently present his proposition to the farmer prospect. Mr. J. A. McDonald, power and light specialist in Toronto office, acted as chairman throughout the sessions.

Representatives of the manufacturers and of the Northern Electric Company were very optimistic of future sales and the dealers shared in this and were very enthusiastic over Northern Electric Power & Light. The dealers expressed themselves as being thoroughly convinced that they were doing their customers a service by introducing the most up-to-date and reliable equipment available. The enviable reputation enjoyed by this company in Canada assured for the dealer and his customers reliable equipment and real service.

Run a slogan in your advertising at least once a month, something like this: "Buy your electrical goods at an electrical shop." Do not let the hardware and drug stores get away with the business which rightfully belongs to you. Put up a fight that will win out.

Sale of Electrical Labor Saving Devices to the Farmer

By Mr. W. P. Tice

The first thought that occurs to the writer is, will the idea of appliances come first or last, and while it is true that the apparatus to produce the current supplying the appliances must necessarily come first, one must have a thorough knowledge of the appliance situation, as it is as necessary as the study of the apparatus itself, for its conclusion is the installation of the appliances, they always come no matter what the first plans are, for they are the real life and essence of the power and light installation, and without them it would be like a cart without a horse. So never worry about the sale of appliances—**put them in, send the bill, they sell themselves.**

Do you really know the farmer? If not, go out and get acquainted, and especially so the women folks, for no other class are as consistent and long-hour workers as they are, and also with the fewest helpful devices. Did you ever have the opportunity to study the women on the farm during her daily tasks? If not, do so, and you will have all the necessary sales helps to sell them the useful appliances that they require, and when you have sold the farmer the useful and labor-saving devices, you have accomplished a real service. As previously stated, study the farmer, and it will be an interesting study too, for he is a different type of man than you have come in contact with, and one that requires a different class of salesmanship than you have before met with. He has not had the years of training and demonstration in the electrical lines his city brother has, and the field is very fertile, but do not make the mistake of trying to impress him with your greatness, but talk to him as man to man, for he is not interested in sales rhetoric. Show him, for he certainly is the answer to the common expression "I am from Missouri." Impress upon him the many advantages of a water system, for it is one of the most important appliances on a farm, and constitutes the greatest of labor-saving devices to him. Assuming that the light installation is the primary feature which seems to be the case, although I do not see why, and after it the water system, then what do you think naturally comes next? Why, the devices that will lighten the labor of the wife, for it is a known fact that the farmer is more considerate of his own womenfolks than is the city man, and will put in an iron and washing machine quicker than a feed grinder, if the value is shown him first. Settle the women part first, then you can go to work and install a separator, churn, grinder, milking machine, sheep shearer or clipper and the many other useful and labor-saving devices that are now on the market.

You will find that, due to the rapid progress made in power and light equipment, it will hustle you to keep up with the development of new devices being manufactured from time to time. There has been much written upon the proper methods of approaching the farm prospect, some of which are very good, but I honestly feel that personality and good, clean-cut, right-on-the-farm demonstration, is by far the most successful. I do not think it necessary for me to go into detail with each piece of apparatus, as the manufacturer of appliances has done so very thoroughly, and his literature will be of good help to you to sell successfully. You must know the device cover to cover, and if you do not, make it a point to take each and every device to pieces, and study it carefully, and learn how it operates, how it is put together and its purposes, for no one can be a successful farmer salesman unless he does know all about the device he is selling, for you know the farmer is from "Missouri". He never has had a machine or a repair department to run to, like his city brother, and has had to take his machinery to pieces to see how the darn thing works, and has had to make his own repairs, so you will find him a far better mechanic than is commonly supposed, so don't let him have to show you how the wheels go round. You will impress him more if you can show him, for he knows that all mechanical contrivances, at some time or other, need repairing, and he wants to know the whyfor.

This was supposed to be a talk on how to sell the farmer labor-saving devices, and I am afraid I have considerably transgressed the subject, but it is not the same kind of selling one would meet with in the contractor-dealer or city customer, and requires different methods, principally personality and a thorough study of the needs of the farmer. Nickel-plated and gold trimmings have ceased to exist to him, as has the gold brick.

Many estimates have been made of the number of power and light prospects, which I am not in a position to deny or confirm, but such being the case, a glance shows what an enormous volume of appliances are to be sold to keep up with the estimates, and you, Mr. Dealer, are the logical one to sell them, and they all carry a well worth-while profit, and then, too, they are a never-ending source of profit, as they continue to increase in numbers, and as is the case with lamps, they continue to be always in demand. The sales prospects are as bright as the sewing machine salesman's slogan, "Every bride a prospect, and never worry 'till the marriage rate declines."

What are Your Sales Plans?

By Mr. Sydney Neu

The old-time business man trusted to luck. If business was good it was good. If it was bad, too bad, he must make the best of it.

The modern business man believes in initiative. He believes that business is never so good that he cannot improve it by effort. And by this initiative he has moved the old-timers to the side streets and the back alleys where they gradually drop out of the running. He plans and executes.

Before you can plan you must know. You must know what your sales were last year, not only in total but in each individual line. You must know what stocks you carried, not only in total but in each line so that you can figure your turnover. You must know what your expenses were and how much of this expense was caused by each line. If you do not know these things the first step is to find them out.

The next step is to analyze what you know. This line required a large stock and moved slowly; was this a fault of the line or because you did not display it and push it? This line sold so fast that you lost sales through insufficient stock. This line had a big mark up but it took so much clerks' time to sell it that it probably made you little money.

After you have digested the facts you can plan. You will throw out this line entirely. You will push this line hard and double your sales. This line you will keep constantly in your show window and expect sales in increase to three times. And so on.

But plans are not enough. The plans must be put into action and kept going. They must be checked up frequently. If sales in any line are not up to the mark you have set, you know it is time to concentrate your advertising and display and sales clerks on that line.

Plans and records are essential to any business success. The best use you can make of your own time is in making plans, watching the records, and keeping things moving faster. Leave the mechanical work to those whose time is less valuable.

Complete Electrical Equipment for the Home

By Mr John G. Learned*

There exists a community of interest among electrical manufacturers — jobbers — dealers—contractors and central stations in the fostering of the complete electrical equipment of the home,—therefore, the plan of the National Electric Light Association—Commercial Section, to bring about a nation-wide educational campaign for the purpose of creating a greater demand for complete installations of wiring and appliances in the home will meet with your favorable consideration.

Although the electrical industry has made most remarkable strides in the last 25 years we have been woefully deficient in focusing our efforts on educating the public to the unit idea of electrical equipment in the home. Electric lighting installations are fairly well handled, although there is vast room for improvement, whereas the necessity of an adequate number of outlets for the use of portable and electrical appliances has been sadly neglected—by comparison. The future permanent success of the "Residence Service" branch of our business depends largely on our ability to so thoroughly educate the public that the lay man and lay woman will be as conversant with the complete unit electrical equipment of the home as they are now with the electric starter, the electric headlight, the electric horn and the other refinements of the automobile. There never was a more opportune time than now—especially on account of the present shortage of household help.

The Commercial Section of the N. E. L. A. plans to get the manufacturers of electrical heating appliances, washing machines, vacuum cleaners, portable lamps, fans, vibrators, hair dryers, sewing machines, etc,. accessories and other appurtenances used in the home, to include in their national advertising **an illustration of the baseboard or wainscotting receptacle;** the idea being to show the particular appliance advertised and the cord connecting it to a receptacle. This can be done without any additional expense. Those manufacturers, who have had this matter brought to their attention are very enthusiastic and have already taken steps to co-operate.

Central station companies are having this matter brought to their attention, and are being urged to feature appliance outlets along the same lines in local newspaper advertising —on billboards—customer's bills—and salesroom advertising. Department stores will be urged to follow suit. Jobbers, dealers and contractors should get behind this campaign—which is not for a week or a month but continually—the results will be cumulative.

Another method of bringing the message home is to make up window displays of appliances with their cords connected to receptacles mounted on section of baseboard or wainscotting.

Special attractive advertising in pamphlet form on this subject of receptacles will be prepared for distribution to architects by central stations.

Below I quote the advertising manager for a manufacturer who is particularly enthusiastic on the subject:

"One way to increase the interest and, therefore the installation of more adequate provision for use of electrical appliances in the home, is to form a small committee to outline a complete campaign to cover a given period of months. Some of the things to be done are as follows:

(1) Prepare cuts of several sizes and kinds to be furnished to all manufacturers of electrical goods and to have these cuts used similarly to the Bond and War Savings Stamp will therefore act as constant reminders to all of us in the electrical industry and those cuts used in the national media by the various manufacturers who advertise in such publications will help to bring home this campaign to the public in general.

The cuts mentioned above can also be used in the various folders, literature and on letter-heads, during this same period regardless of what the folders or other literature describe.

(2) Special Folders and Other Printed Matter

Folders and other small pieces of printed matter to be prepared specially on this subject of the advantages of more adequate equipment for the use of electrical appliances, and this material used as envelope stuffers by lighting companies, manufacturers and their district offices, engineers, electrical jobbers and electrical contractors and dealers. A good portion of these stuffers would therefore, reach the hands of the public also.

(3) Small Stickers for Letter-heads

A series of these could be prepared covering the subject which could be used over a period specified in the campaign by the same group mentioned above. Many of these would come to the eyes of those interested in building.

(4) Manufacturers making devices which would be consumed in installing adequate equipment in the home, would be urged to extend their advertising and concentrate on devices such as receptacles, etc., during the period decided upon for this campaign. These same manufacturers will furnish to the dealers, contractors, and lighting companies, small electros and other suggestions, advertisements, and folders, which could also be used for local and newspaper advertising by the contractors and dealers and electric lighting companies.

(5) Little stories, articles, and illustrations could be prepared for the various electrical journals as well as some specially prepared for the general publications such as Good Housekeeping, Woman's Home Companion, Ladies Home Journal, House and Garden, etc.

I am sure we can get in touch with the persons preparing these articles for such magazines and have the need for adequate outlet equipment emphasized in these articles and possibly, have at least one article devoted to that one subject alone.

(6) Electric lighting companies during this period could also be instructed on attaching slips to the electric lighting bills, slips giving a message concerning the conveniences of more adequate wiring of the home.

(7) At the same time, the architects and electrical contractors figuring on wiring jobs should be urged to bring the matter of convenient outlets to the builders' attention, since a good many people still are not familiar enough with electrical work to appreciate the wonderful convenience of having many outlets, as for instance in the baseboard and do not realize that the addition to these outlets does not mean very much greater cost when figured over a period of say five to ten years.

(8) Short Movie Films and Slides

There are a number of companies prepared to make up movie films which are produced in such a satisfactory manner that the moving picture houses throughout the country are glad to make use of them in connection with their usual program. In such films, a very forceful appeal can be made and the convenience of many outlets can be played up in a pleasant though distinct manner and the disadvantages of a poorly equipped home emphasized. The mind of the theatregoer is in a particularly receptive state when looking at the screen and such films in connection with other slides advertising the installation of various receptacles by local contractors and lighting companies will tie up very strongly with the other promotion work noted above.

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*Before Milwaukee Convention National Association Electrical Contractors and Dealers.

(9) The subject matter for advertisments might play up the saving in wear on electrical fixtures; the great convenience of electrical appliances is made still greater by the provision of adequate outlets or attaching places for the ready connection of electrical appliances in various rooms, to electrical circuits; safety could be emphasized also.

(10) Various little stickers for use on letter-heads might have subjects similar to the following:

"When Wiring Your Home Have Outlets Arranged for Your Electrical Appliances."

"Double Electrical Conveniences—Have Extra Outlets for Electrical Appliances."

"Save the Wear on Electric Fixtures—Connect Your Electrical Appliances to Baseboard Outlets."

"Have Extra Outlets in your Laundry as Well as in Your Living Rooms for Your Electrical Appliances."

"Electricity is Your Servant—Have Outlets Installed for Your Electrical Appliances."

These ideas are formed only in part but they serve as a starting point and could be developed into more complete form and augmented after a little conference on the subject. With any kind of work it is easier to have some actual start than to just talk the matter over.

Slogans and Text Matter

Follows some ideas intended to suggest slogans and text matter which might be further developed in detail for use in support of a campaign for more electrical outlets.

(1) "Let out pent up Electric Service by installing more outlets."

(2) "Electrical outlets increase house values. Provide one or more extra outlets in the floor, baseboard or wall in every room for the convenient use of Electrical Appliances and Portable Lamps."

(3) "Modernize the (your) home with extra outlets for the use of Electrical Appliances."

(4) "Take full advantage of Electric Service. Install extra outlets in every room for the use of Time and Labor-Saving devices—Electrical Appliances."

(5) "Extra outlets for Electric Portable Lamps—for utility and beauty."

(6) "Advocate Installation of Extra Electrical Outlets —for Appliances and Lamps."

(7) "Extra outlets promote sale and use of Electrical Appliances and Lamps."

(8) "Campaign for more Electrical Outlets."

(9) "Insufficiency of Outlets Restricts use of Electric Service. Increase sales of Electrical Appliances and Lamps. Install one or more outlets in every room of every home."

(10) "In wiring old houses install generously well-located electrical outlets."

(11) "Provide Complete Electrical Installations in New Houses—especially outlets for Appliances and Lamps."

(12) "Numerous faucets are provided in the home for the convenient use of water. Why not more outlets for the use of Electrical Appliances and Lamps?"

(13) "More outlets for More business."

(14) "More Electrical outlets—more Satisfied Customers."

(15) "Extend Electric Service by installing more Outlets."

(16) "Don't rob Peter to pay Paul. Install more outlets for the simultaneous use of Electrical Appliances as well as Electric Lighting."

(17) "The Modern Home Uses Electric Service. Extra Outlets in each room for the convenient use of Electric Appliances Solves the Servant Problem."

(18) "For quick, convenient use of the Electric Heating Pad provide an extra outlet in Your Bedroom."

(Note: Series of such phrases—to apply to all Electrical Appliances and Lamps for all applications—can be developed for use by manufacturers, etc.)

(19) "For Complete Electric Service in Your Home Install Extra Outlets in Every Room. Use Electrical Appliances and Portable Lamps."

(20) "In nearly every house nowadays some provision is made for the use of electricity, but very often too few outlets are installed for the convenient use of Electrical Appliances and Portable Lamps. To rectify such omission after house is built is expensive.

Moral: Make your Electrical installation complete at first. Install extra outlets in every room."

(21) "Electric time and labor-saving appliances have become a necessity in the modern household. Provide for their convenient use by installing extra outlets in every room."

(22) "Electricity will increase the value of your property many times over the small cost of your investment. Be sure your installation is complete. Install one or more extra outlets in every room for the use of Electrical Appliances and Portable Lamps."

(23) "Mr. Business Man—You use several telephones in your office for good business reasons; also for convenience. How about your home? Extra outlets in each room permit the convenient use of time and labor-saving devices—Electrical Appliances Give a Thought to the Wife. Install more electrical outlets."

(24) "For Comfort, Convenience and Economy Install Extra Outlets for Electrical Appliances and Portable Lamps."

(25) "In planning your home provide for modern plumbing, adequate heating and complete electrical equipment. Be sure to install extra outlets in each room for Electrical Appliances and Portable Lamps."

(26) "Do a good job while you are about it. Don't skimp on Electrical outlets."

(27) "You buy furniture, rugs and decorations to make your home 'comfy' and artistic. Electric Portable Lamps enhance the whole. Install extra outlets for their use."

(28) "Baseboard outlets or outlets on the side walls which make it unnecessary to stoop down when attaching Electrical Appliances, should be installed in every room in your home."

(29) "An extra outlet or two installed on the porch will be found useful for attaching the Electric Fan or Portable Lamp."

(30) "Install outlets in the halls for use of the Electric Vacuum Cleaner."

(31) "It is modern to 'Do it Electrically.' Install necessary outlets in every room for the use of Electric Appliances and Portable Lamps."

(32) "The Completely Electrified Home Will Remain Modern for Years to Come. Install Plenty of Outlets."

(33) "Electrically Operated Pianos and Phonographs are popular. Provide for their use. Install Extra Outlets."

(Note: Makers of such equipment might be induced to co-operate in the campaign for more outlets—help them as well as the electrical industry).

It follows as a matter of course that if this work is taken up in a big way as outlined that the public will be educated to the necessary degree with the result that a big demand will be created for wiring, receptacles and appliances.

The contractors will do more wiring, the dealers will sell more appliances, the jobber will do more business—the manufacturers will turn out a larger volume of products—the central station will enjoy more revenue and last but not least the consumer will enjoy complete residence service.

Report of House Wiring Committee of the National Association of Electrical Contractor-Dealers

The duties of this Committee, as outlined in the organization plan of the National Association of Electrical Dealers is referred to as follows:

"To investigate and develop data and circulate information regarding methods of securing and cost of installing electrical materials."

As the Minutes of our Association do not show that any previous report has been made on the work of this committee, this must therefore be considered as the first report and recommendation of the House Wiring Committee.

In the past and particularly to-day, the wiring of old and new houses has been and is an important and large part of the total business of the greater number of electrical contractor-dealers. The majority of new houses now in course of construction are already wired for electricity, so that this class of business comes to the contractor dealer without any effort on his part to secure the same, but it is the many old houses that offer the greatest opportunity to the contractor-dealer, who will actively solicit this business in an intelligent manner, and from the following figures it must be assumed that old house wiring is a large part of the total business of the majority of our members.

The last report of our General Manager shows 1,613 classified members. Of this number, 603 are in class "A" doing business up to $12,000; 343 are in Class "B," $12,000 to $25,000; 393 in Class "C," $25,000 to $50,000; and the balance, 274, doing business above $50,000, making approximately 83 per cent., or a total of 1,339 members doing business of less than $50,000 yearly, to whom the house wiring business must appeal, and to the balance of our members as well, if the work could be secured on a profitable basis.

The present data available shows that in the United States to-day, a very small percentage of the houses are wired, and this business offers an all year opportunity to the contractor-dealers to secure this work as well as the many appliances, fixtures, etc., that must follow the installation of the wiring.

The field is more fertile to-day than ever before. All war restrictions have been removed, the central stations are in a better and stronger position to supply the energy and extensions, and the "Buy Your Home Movement," which is being so widely exploited by the Department of Labor, makes the general public realize that every man is entitled to live in a comfortable home with cheerful surroundings and modern conveniences, and certainly electricity offers the greatest opportunity to increase the comforts of the home

So that the Committee could be better informed as to the actual conditions existing throughout the country, and to secure data that would show in a general way what plans contractor-dealers have put into operation for securing old house wiring, a questionnaire was mailed to every member, a copy of which is made a part of this report, and the following is an abstract of the answers received:

Total replies	84
Number of States	26
Number of Cities	60

The number of contractors answering this questionnaire composes a very small percentage of our membership, and it would seem that a larger number would be sufficiently interested in this subject to answer the questions noted therein.

A sufficient number of States and cities have been heard from, however, so that it has been possible for your Committee to secure information covering the entire country, even though a number of States are not represented.

The replies to questions are given in general terms as follows:

Fifty-three cities report that local central stations are co-operating with the contractors, and house wiring contracts are secured by the central stations and turned over to the contractor dealers either on a unit price basis or lump sum contract.

Ten cities report that the electric light company execute the work with their own wiring department.

Twenty-seven cities report that the contractor-dealers advertise for house wiring, and the same number have solicitors..

Forty-eight suggestions were received for stimulating business, some of which will be mentioned in this report.

The replies as to the number of old houses wired in the various cities range from 10 per cent in Brooklyn, N.Y., to 98 per cent. in Seattle, Wash., showing a larger percentage of unwired houses in the East than in the West. The rate of current varies from two and eight-tenths cents per kw. in Portland, Ore., to 16c per kw. in Southampton, N. Y.

The data received regarding the prices for which this work is being installed, will be presented in another part of this report..

All of these replies will serve to show that, first, the central stations throughout the country are co-operating with the contractor-dealers, for extending their services into old houses now unwired, and that conditions are steadily improving in this respect from day to day. Second, that in the East and also in the thickly settled cities of the West, a large opportunity awaits the electrical contractor-dealer for securing old house wiring business. Third, that the rate for current is cheapest where the larger number of users of electricity reside, and by increasing the installation of wiring in more homes the cost of current should be reduced. Fourth, that not sufficient activity has been shown by the contractor-dealer either to actively solicit or adopt newspaper advertising. They have been content to remain dormant and allow the central stations to build up large organizations to solicit and secure house wiring business, instead of stimulating this business individually or co operating with the central station to do this work, for them.

Your Committee has also communicated with a number of cities in which the central station and the contractor-dealer are already co-operating on a satisfactory basis. These cities are now carrying on active house wiring campaigns, the result of which show wonderful progress towards a closer understanding between these two important branches of the industry.

From the figures available, it is estimated that over 24,000 homes were wired during the six weeks of this drive In a number of these cities, the contractor-dealer and central station are continuing the campaign with further success.

Contractor Dealers Working at a Loss

Returning to the prices, which are now being charged by the contractor-dealers for the installation of old house wiring, the replies to the questionnaire develop the fact that the majority of the contractor dealers are doing this work at a loss, when they should be receiving a reasonable profit, over and above the cost of labor and material. plus their actual overhead. The prices range from $2.00 per outlet in Battle Creek, Mich., as well as two cities in Illinois, to $5,25 per outlet in Louisville, Ky., and $5.00 per outlet in Baltimore, Md. These prices show definitely that the work is not being figured on an intelligent basis and that a majority of our members should first be educated and informed as to the proper cost for installing house wiring; amount of material required; the proper manner of installing the work profitably, and the cost of labor for placing the work.

It is not necessary to do this work at a loss to secure the business, as has been the habit in the past of a large number of contractors, as well as some of the central station companies, as the majority of house owners are supplied with increased funds at this time, and statistics show that they are spending more money for luxuries than ever before, and electricity is not a luxury.

We are also assured that prices for labor and material will not materially decrease, and that every indication points to a long period of prosperity. It is therefore important that the electrical contractor-dealer take stock of himself and the prevailing conditions, forget what has been charged for this work in the past and settle down to a basis, where he knows his actual present cost and necessary overhead and charge a reasonable profit for his services.

That contractor-dealers in every city where there are local associations, appoint a committee to meet with a representative of the local central station, to discuss the proper methods of securing the house wiring business in their community. The committee should know the actual cost of labor and material entering into the installation of old house wiring, and to secure this information, every member should submit his cost sheets, showing the past cost to the contractor-dealer. This committee can then tabulate and disseminate the information. The central station could then distribute all the work to the contractor-dealer, pay them when the work is completed, collecting from the customer either on regular terms or on deferred payment, as may be most desirable.

At this time it might be well to suggest that the deferred payment plan has been very popular and has resulted in securing increased house wiring orders; therefore, an arrangement that would permit the contractor-dealer to secure the business and turn it over to the local central station to make the monthly collections, would be preferable. The Morris Plan Bank, who already have branches in a number of cities throughout the United States, are prepared to handle the deferred payment business, if the contractor-dealers prefer to work individually.

A number of contractors have stated that they do no house wiring, because it is not profitable, and the reason it is not profitable is simply that no attempt has been made to keep accurate cost sheets. This is most important; know your cost and then go after the business with a reasonable profit.

Many contractors have no systematic method of estimating house wiring, either a back of an envelope or a business card is considered sufficient for estimating any size job. Your Committee would recommend for unit price estimating, a form similar to copy attached, which gives sufficient space to properly note each room, outlet, switch, plug, etc., and allows less opportunity for omitting necessary parts of the estimate, which usually results in a loss to the contractor-dealer.

Your Committee has learned that a number of contractors in the past have found it necessary in connection with house wiring installation below $300 to add 50 per cent to the net cost of labor and material in order to be properly covered. This for the reason that the overhead on this class of work is higher than store, industrial lighting or power installations. The average time required to wire a three-storey house is from five to fifteen days; the cost of material is about 40 per cent of the total cost of the work, labor representing the balance, so that the time necessary to install this class of work is of such duration, that it is necessary to add a larger percentage to cover the increased overhead.

In all house wiring, use only the best materials, recommend to the owners that switches add to the convenience of the installation and should be placed for all important rooms. Do not place the control of electricity in the same class as the old-fashioned gas jet—and now the appliance outlet; study the requirements of each room and suggest to the customers the advantage of having a number of these outlets placed throughout the house; the average customer having electricity installed for the first time, is not familiar with these conveniences, and the contractor-dealer is the one to urge the installation of the same.

Your Committee would further recommend that the contractor-dealer advertise more freely, intensive campaigns, during the spring and fall to be followed up by active solicitation at all times, would result in increased business. Every contractor-dealer should co-operate with his local association, the Society for Electrical Development, and any group of contractor-dealers that might be established, to develop house wiring business.

Selection of Wiremen Important

So many home owners associate the installation of electrical lighting with endless dirt and mess and the tearing out of walls and plaster, it is therefore extremely important to educate the public that wiring can be installed without the discomfort, trouble and inconvenience; only trained and careful wiremen should be employed on house wiring. They should be instructed to begin work on the top floor, finish up the work in each room before going into another and completely finsh each floor before starting the next. This may seem like a trivial explanation, but it is with the idea in mind of reducing the labor cost through the proper education of the wiremen to methodically install this work, which will result in more houses being wired at reduced cost to the public; therefore a proper selection of wiremen is recommended; those who are neat, careful and courteous will appeal to the house-wife.

It would be wise to give these men the opportunity, at regular periods, of discussing with each other what they have found to be handy kinks in saving time in the installation of house wiring; this in itself would make the labor factor less uncertain and at the same time reduce the cost of the work.

Your Committee further recommend that central station and contractor-dealer as well, should discourage the installation of lighting outlets for single drop cords without switches or convenience outlets; simply to place electric current in the home.

Experience has proven that the public is usually dissatisfied with this class of work, while the recommendation of a satisfied customer means increased business, quality work should be the keynote of every contractor dealer's policy, and no consideration should allow it to be sacrificed.

I would strongly urge that contractor-dealers tie in with the national advertising that the various manufacturers are publishing in the weekly and monthly magazines, as through this unification we should reap the benefit of the millions of dollars that are yearly being spent to advertise electricity. This can be accomplished by timely window displays, attractive stationery, intelligent salesmanship and systematic follow-up calls and letters.

I would therefore suggest before closing, that some uniform method be established for estimating new and old house wiring, and when perfected, be submitted to the membership.

How I Increased My Sales 100 Per Cent.

I am a salesman for a well-known Canadian firm handling farm lighting and power plants. Like everything else these days it's a case of selling "service." The farmer doesn't care much about our equipment—he has lots of machinery to look after already—but he has been around in his motor car and seen how towns and cities are nicely lighted up at night and so he is beginning to realize that when he gets back home it's pretty dark around the house and barn. This applies to the young people especially who are not so set in their ways.

It's a slow enough job though getting after the farmers one by one and so I take advantage of every opportunity of impressing them collectively. For regular demonstration work I have a 1 kw. plant mounted on a light motor truck and during the past couple of months I have been making a specialty of rural evening gatherings, especially garden parties. It is true enough that young people don't always want too much light at such functions but in this case it's such a novelty that they flutter around it like moths and this better system of lighting has become so great an attraction and has improved the attendance so greatly that I and my plant are in constant demand.

I make no charge for the service supplied—about fifty 20-watt lamps—except that the printed notice must state that "the grounds will be illuminated by—light." Of course if the chairman cares to make a few flattering remarks—and he invariably does—I don't raise any objection. This plan yields us big dividends for two reasons: (1) We demonstrate to a large number collectively and (2) we catch our customers at a time when they are in their most receptive mood. They like the idea of carrying this holiday spirit, this brightness, into their homes and their daily work.

In the winter I expect we shall attend the evening entertainments, Christmas trees, home dances and so on. The farmer is a good fellow when you get under the skin—not too anxious to part with his money but liberal enough on occasion. He likes his telephone and his automobile—and he'll soon be liking his power and lighting plant just as well.

The Canadian Hart Accumulator

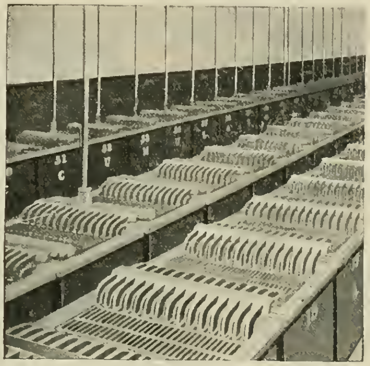
The Canadian Hart Accumulator Co., Ltd., has been eorganized, the management having been placed in the ands of a Canadian directorate. On account of their living n this side of the Atlantic, it is expected that the new directorate will be able to serve better the interests of the anadian trade. Their first step in this direction is the opening of a sales office in Montreal at Room 619, No. 511 St. atherine St. West. The Canadian company was established n St. Johns, P.Q., five years ago, for the Canadian trade, he parent company being the Hart Accumulator Co. Limited, Marshgate Lane, Stratford, London, Eng., contractors o His Majesty the King, H.R.H. the Duke of Connaught, His Majesty's War Office, Admiralty, India Office, General Post Office, etc.

The general principles of construction of the cells manufactured follow that of the English works, but vary in certain details to meet Canadian conditions.

Positive Plates

For the stationary type batteries the Hart cells are itted with demi-Plante positive plates, being a combination of the Plante & Faure types. The grids are cast with a solid diaphragm with approximate 12 horizontal ribs per inch, and the grid is then filled with special active material having high porosity, which permits of free circulation of the electrolyte in the pores. The grid is not chemically formed, but owing to the repeated cycles of charging and discharging, during the course of working, a skin of oxide is gradually formed all over the grid surface. This formation is produced very gradually and is said to be tougher and more homogeneous than the oxide formed on the grid surface by active chemical attack. The gradual formation of peroxide on the plate by this natural process enables the full capacity to be maintained, and although after several years working the active material, which was initially filled in the plate, may have disintegrated, it is always replaced by the naturally formed oxide. The centre diaphragm makes the grid very strong, preventing buckling under normal working conditions.

The construction of the positive plates described above is too heavy for traction or portable purposes. For this class of work, therefore, the positive plate is constructed of an antimonial lead grid having ribs in alternate arrangement thereby securely locking the active material in position. By a special process the active material is rendered very hard and, consequently, extreme durability is obtained, as in course of working it is the positive plates which have to bear the maximum stresses.


An accumulator installation

Negative Plates

For both stationary and portable work the negative plates are substantially of the following construction: The grids are of an interlaced type in which the active material consists of long pellets of oxide held in position by vertical ribs alternating on each side of the plate, thus securely caging the active material and preventing dislodgment. The special oxide which is used has an expansive property which counteracts the tendency to shrinkage which might otherwise occur, and in this way the full capacity of the plate can be maintained during the whole life. For portable work it is essential that the weight be reduced to a minimum and, consequently the antimonial lead grids are lighter castings in proportion to the larger grids, which are of pure lead for the stationary batteries.

Separators

For the stationary type, the separators are in the nature of wood boards, having ribs cut solid from the board and with two extension legs at the bottom for supporting the separator in position between the plates. For the portable type of cells the separators are of similar construction, but without the extention legs, as the plates in this class of battery rest direct on bottom blocks, whereas in the former, the plates are hung in suspension and a clear space is left underneath. In the traction type of batteries, thin hard rubber perforated sheets are also fitted in conjunction with the ribbed wood sheets, the former being placed against the positive plates and touching the ribs of the wood sheets, the smooth side of which will consequently be against the negative plates. It is, of course, necessary that the wood sheets be chemically treated to extract all injurious materials which would harm the plates, and in the usual finished state the wood separators are highly porous and entirely free from resins, oils, etc.

Connections

For stationary cells up to approximately 1100 ampere-hour capacity patent non-corrosive terminals are fitted. The connection consists of special lugs burnt to the positive and negative sets of the cells, the lugs having tapered holes in which are fitted a bolt having corresponding taper. The lugs and connecting bolts are entirely of lead and antimonial lead and consequently there is no possibility of corrosion. When required the cells can be solid-burnt, this being the usual practice with the large batteries for central stations, etc.

Cell Boxes

Up to approximately 800 ampere-hour capacity, glass jars can be provided, but for larger sizes, lead-lined tanks should be used. For the portable types the general practice is to have sealed hard rubber jars.

The Harland Engineering Co.

Mr. A. C. Barfield, manager of the Harland Engineering Company, has recently returned from England, where he has been able to arrange for a number of special and exclusive agencies in connection with electrical equipment, which includes: Berry's Fool Proof Iron Clad Switch Gear; Graham's Loud Speaking Waterproof Naval & Mining Telephones; the Magicoal Electric Fire and Heater; the Telautograph; the J. C. Repeater for long distance telegraph lines, and other interesting equipment which are, they believe, likely to appeal to the Canadian market. The Harland Engineering Company have also recently placed on the market a new electrical interlocking individual motor drive for paper-making machines, which is claimed to be a long way in advance of any such equipment at present on the market. Mr. E. B. Archibald has been appointed to handle this particular section. The firm will be glad to answer any enquiries in regard to any of the above equipments at No. 102 St. Antoine St., Montreal.

Metal Studios, Limited

Metal Studios Limited has recently been granted a Dominion Charter, with head office in Hamilton, Ontario. The new company is manufacturing artistic lighting fixtures for the trade. The organizers are S. Nelson, president; A. Somerville, vice-president, and J. Payne, secretary-treasurer. All these members are expert craftsmen, and have a thorough knowledge of the fixture business acquired through twenty years' experience, and are thus in a position to produce artistically designed goods of superior quality and finish. They have a good organization, proper facilities for manufacturing, and goods are made under intelligent, experienced superintendence by men in whom honest workmanship has become a habit. The success already achieved by the Metal Studios line is evidence of the quality they are putting into their product. They state that they are getting repeat orders daily from satisfied customers. The factory address is 21 Walnut Street, W., Hamilton.

The Zeus Arc Welder

Under the stimulus of war's demands, arc welding increased to a large extent. It is claimed that the Zeus a.c. arc welder, marketed in Canada by J. D. Lachapelle & Co., Montreal, is efficient, speedy, low in consumption of current, and certain in operation. It consists of a specially designed transformer, with a regulator for the various sizes of work. The inherent reactance of the machine automatically stabilizes the arc and prevents the burned weld due to excessive arc length. On the assumption of a 1 c. rate per kw.h., the operating cost is 3 to 4 c per hour. The transformer is oil-cooled. The welder is adapted for overhead welding and is built on the unit system.

The British Government proposes to spend 15 million dollars on telephone extension during the current fiscal year. Five millions will be spent on underground cables and the balance on exchanges and local works. It was admitted in the House of Commons that the service is not satisfactory, but it was said that efforts are being made to improve it. Rates are to be raised.

The death occurred in Nanaimo, B.C., recently, of Mr. Wm. Archibald, who, until the time of his retirement, six years ago, was manager of the C.P.R. telegraph office in that city. He had been in the telegraph service since the age of 14 years, and handled the first cable message ever sent across the Atlantic which was addressed to the president of the United States by the late Queen Victoria.

Mr. G. H. Evoy has recently opened an electrical store at 926 Barton Street East, Hamilton. He will carry a stock of fixtures and supplies and will also engage in wiring-contracting.

Mr. Louis R. Grimshaw, secretary-treasurer Canadian Crocker-Wheeler Company, Limited, St. Catharines, Ontario, died on August 6.

E. A. Wark, Hamilton, Ont., has opened new premises at 31 Mary street, for contracting, fixtures and supplies. He was previously at 167 King Street, East, the location now occupied by Messrs. Hunter & Strome.

Every appliance should have one

PHILLIPS'

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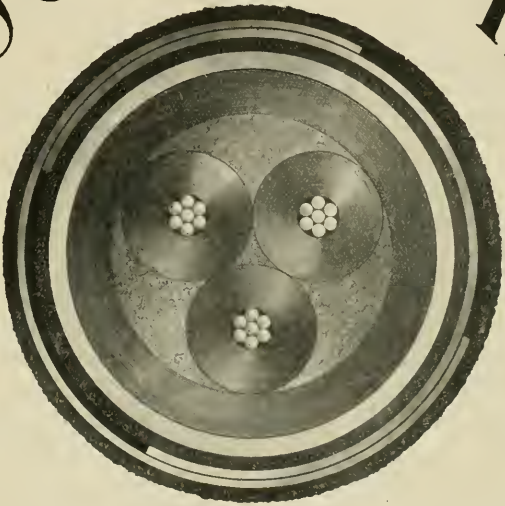

No. 2 B. & S. 3-Conductor 25,000 Volt Cable

Paper Insulated, Lead-covered, Double Steel Tape Armoured

Supplied to the Order of

The Quebec Railway, Light, Heat and Power Company

Eugene F. Phillips Electrical Works, Limited

MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary, Vancouver

Current News and Notes

Brantford, Ont.

The Robbins & Myers Company, of Springfield, Ohio, have announced their intention of establishing a Canadian factory at Brantford, Ont. The company anticipate having about 300 employees at the start, and it is understood they will export extensively throughout the British Empire.

Bridgeburg, Ont.

Surveying has commenced in connection with the projected Hydro radial line from Port Colborne to Bridgeburg.

Hamilton, Ont.

Fares on the Hamilton Radial Railway between Hamilton, Burlington and Oakville, have been advanced. The 25 cent return fare to Burlington is now 45 cents and the 65 cent fare to Oakville is now $1.00. Special commutation tickets are issued for those who use the line regularly and are considerably cheaper. The Burlington citizens objected so strenuously to a proposal for increased fares when it was brought up some months ago that the matter was temporarily shelved. It seems now, however, that they must accept the inevitable.

Islington, Ont.

The Ontario Hydro Commission have been granted permission, by the Etobicoke township council, to erect a pumping station on Mimico Creek for cooling the new transformer which is to supply power for Mimico, New Toronto, Etobicoke and the township of Toronto. At present the power is distributed from Cooksville.

London, Ont.

The London and Port Stanley Railway has turned over to the city of London the sum of $48,000 in full payment of all accrued interest and sinking fund charges and, in addition, $10,000 for rental due. The line is said to be in a very prosperous condition.

Montreal, Que.

The Sunshine Lamp and Supply Company, Montreal, have been granted letters patent. The capital stock is $20,000 and the head office Montreal.

Mount Lehman, B.C.

The farmers in the district of Matsqui have appealed to the Western Canada Power Company for a supply of electrical current for their farms.

Perth, Ont.

The Perth Hydro-electric Commission have announced a program of improvement for the town's street lighting system.

Port Arthur, Ont.

A newspaper item states that Sir Adam Beck, chairman of the Ontario Hydro-electric System, has offered to take over the railways of Port Arthur and Fort William and place them on a paying basis under one management.

Port Colborne, Ont.

By a majority of 141 the ratepayers of Port Colborne, Ont., recently approved the by-law authorizing the purchase of the distribution system of the Ontario Power Company from the Hydro-electric Power Commission and for the issuing of debentures to the amount of $40,000 to cover the purchase and necessary extensions.

Quebec, Que.

Lapointe & Cote, Limitee, have been incorporated with a capital stock of $49,000, and head office Quebec, Que. Among other things they are empowered to carry on the business of electricians.

Toronto, Ont.

The Excelsior Electric Dairy Machinery, Limited, has been granted letters patent under the Ontario Companies Act. They will take over the present business of the Excelsior Electric Manufacturing Company and the Excelsior Electric Limited, and are empowered to manufacture and deal in electric motors, machinery and equipment of all kinds. The capital stock is $100,000, and the head office Toronto.

An interim balance statement and revenue account submitted to the city council by the Toronto Hydro-electric System for the half year ending June 30, shows a total income of $1,193,054.81. The expenditures are as follows: Electric current, $327,771.71; expenses of operation, management, repairs, etc., $346,082.09, a total of $675,859.80, leaving $519,195.01 as net income from operations for the period. This has been applied as follows: Interest, $204,295.54; sinking fund, $79,276.17; balance for depreciation and adjustments, $235,623.72. The total revenue of $1,193,054.81 compares with $1,157,108.44 for the corresponding period in 1918. The balance for depreciation and adjustment last year was $154,663.36.

The Hydro-electric Power Commission of Ontario have made formal application to the Minister of Finance at Ottawa to reimburse them for expenditures made on behalf of the municipalities on extensions to supply necessary power for the manufacture of munitions and war materials ordered from time to time by the Dominion Power Controller.

Vancouver, B.C.

Members of the B. C. E. R. office staff recently held their fourth annual picnic at Bowen Island. The attendance was about 340 and the officials of the company, including Messrs. George Kidd, W. G. Murrin and F. R. Glover, assisted in the festivities.

West Vancouver, B.C.

The council of West Vancouver, B.C., are negotiating with the B. C. E. R. Company for a supply of light and power. The B. C. E. R. Company will co-operate, it is understood, providing they are given an exclusive franchise.

Personals

Mr. H. D. Stock, for some time manager of the Bell Telephone branch at Belleville, Ont., has resigned to go with the Wood Milling Company of Hamilton.

Mr. Daniel Toomey, for many years district superintendent of the Niagara, St. Catharines & Toronto Railway System, has resigned, and Mr. O. C. Elliott, who has been acting as special agent of the railway has taken his place.

Mr. C. W. Wiggs, (Capt. Canadian Army Pay Corps) Quebec, after almost five years' service overseas in France and England has re-entered commercial life. At the first meeting of the directors of the Mechanics Supply Co. Limited, of that city, since his return, he was elected a director of the company. Owing to the retirement of their sec.-treas., Mr. W. C. Teackle, who recently resigned to take a more lucrative position with the Herman Young Co., this joint office has been filled by the appointment of Mr. W. R. Wilkinson as secretary and Mr. C. W. Wiggs as treasurer.

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The Rights of the Public Must Take Precedence Over Those of Labor

The strike of a few operators on Wednesday afternoon, September 3, in Toronto, which tied the street railway service up for over four hours and inconvenienced in varying degrees a half million people, has done more to alienate the sympathy of the general public from labor as a class than anything that has occurred in recent years. Strikes are wilful waste under the most favorable circumstances, but with conditions as they were in Toronto during Exhibition, it is a strange thing if our laws do not admit of prosecution, as a criminal offence, the men responsible for more than a hundred thousand women, children and babies in arms being stranded miles from home.

Laws in general are made to protect the public. Any action on the part of any individual that endangers the public safety, or causes the public annoyance or inconvenience, is subject to control by law. It is for this reason that our neighbor may not keep musical fowls to awaken us at 4 o'clock in the morning. Neither may he institute revolver practice in his back yard, drive his motor car faster than so many miles per hour, rush past a standing street car in his motor, spit on the sidewalk or in the street car, or roam at large when he is suffering from an infectious disease—the idea underlying all law is that the public has rights which are superior to those of the individual.

Yet here we have a mere handful of men deliberately and intentionally causing pain, sickness and weariness to two or three hundred thousand people. If our laws do not cover such a case they are stupidly inadequate. If our legislators do not see to it that the men who caused this trouble are severely punished, they will be neglecting the plainest public duty. It is futile to talk about labor's right to strike. The rights of the public must take precedence.

Standardization of Plugs Would Make Appliance Sales Easier

If the Outlet Box Section of the Associated Manufacturers of Electrical Supplies can standardize their products as reported in our last issue, why cannot other electrical products be standardized? What justification is there for a dozen different cords in the average home for use with as many different appliances—these cords all having different plugs at one end and frequently at both ends? What chances are here for annoyance and delay. Frequently, even, appliances are delivered without inquiry having been made as to the plug required and, often, again, where changes have to be made, there is an additional charge—all of which tends to irritate the customer. It is just more of our old policy of making it as difficult as possible for the housewife to become sympathetic with electrical goods.

It may be that manufacturers in general fight shy of standardization because they feel that they have built up a good business on their own particular style which will necessarily be sacrificed for the standard type. But aside from sentiment, where is the loss? The demand for electrical devices would be tremendously increased by such standardization and there would be more business for everybody. Quite aside from that, however, it is poor business to overlook an opportunity for such economy as this would introduce. It alienates the sympathy of the public and sooner or later will react on the industry. Rather let us convince the public that we are working along lines that are in their best interests. Their hearty co-operation, coupled with the satisfaction of developing the industry along right lines will yield the best results in the end.

Minimize Danger of Dust Explosions by Static Charges

The Ontario Fire Prevention League held its annual meeting in Toronto on September 4. Among those who addressed the League was Dr. W. W. Brown of the Department of Agriculture, Washington, on "Dust Explosion." Dr. Brown is an authority on this subject, having made an intimate study of the causes of such explosions in mills, elevators, threshing machines, refineries, and similar structures. The interest in dust explosions has been stimulated in Canada by the recent terrible disaster in the Government's grain elevator at Port Colborne, Ontario.

The Bureau of Mines of the United States Government took up the matter of dust explosions in 1913, as a result of a severe disaster in which many lives were lost.

Funds for these investigations were supplied, at that time, by millers who were anxious to determine the exact causes of these explosions and develop the means for their regulation and ultimate elmination. This work of investigation and experiment was later transferred to the Department of Agriculture, Washington. Since the inauguration of this branch many disasters and fatal explosions have resulted from dust causes, but it speaks well for the investigators that no explosions of a serious character have resulted in any of the plants in which remedial or preventive measures have been installed.

Dust explosions, according to Dr. Brown, are comparable to gas explosions, in that there must be a properly proportioned mixture of dust and gas with the proper spark or source of heat. No dust explosions can result if either the means of ignition are insufficient or the mixture of dust and air is not sufficiently intimate or properly proportioned. Any dust from a combustible material will explode under these conditions with an intensity that will bear comparison with that of any gas explosion. The pressure developed and the rate of propagation of the flame, in the case of dust, may equal, and in any case will not be much less, than with explosive gas mixtures.

Extensive investigations have proven that the pressure developed and the speed of propagation of flame in many dust explosions is nearly equal to the corresponding pressure and velocity developed in gas explosions. So similar are these explosions that it is not beyond the realm of possibility to expect in the near future internal combustion engines operated by dust instead of gasoline.

To indicate the amount of dust necessary to cause explosion the following figures were given: 23/1000 of an ounce of dust per cu. ft. is sufficient to cause explosion. To utilize all the oxygen in the air 111/1000 of an ounce of coal dust is necessary. With starch dust, this figure is 22/100 of an ounce. It has been found that the dust cloud can be ignited at comparatively low temperatures and, indeed, one prolific cause of explosion is static electricity. This applies for example, to threshing machines in the West, where explosions of smut dust, caused by static charges, have produced destructive effects. Measures adopted to counteract these effects comprise suitable grounding devices attached to the machines in which the static charges are generated. As far as mills and elevators are concerned, the means taken to combat dust trouble are to maintain cleanliness in the plant and to localize the possibility of spread of explosion. By the adoption of suitable methods of isolating various parts of the plant, disastrous results may be very greatly minimized. In addition it is obvious that cleanliness is one of the best fire and explosion preventives to be adopted where dust explosions are possible.

Four Mile Grounded Neutral Transmission Line in Successful Operation

A paper on this subject was recently presented before the A. I. E. E. by Mr. W. S. Richards, covering conditions on a system in Toledo, which was originally delta-connected. The transmission line in this case consisted of an extremely high and long span overhead construction, connected directly to an extensive underground system with its various connections to conversion apparatus.

The system in Toledo was built more on the line of developments following existing industrial requirements than a pre-arranged system where future requirements were anticipated.

In this case, an industry, by reason of circumstances, was located some four miles from the generating station. Conditions were such that it was not desirable for the customer to generate his own supply. His requirements started with a demand of from two to four thousand kilowatts, with the ultimate expected demand of eight to ten thousand. As the industry has exceeded their expected increase, the demand on this system will shortly run to sixteen thousand kilowatts, and possibly greater.

Geographical conditions and city ordinances determined that this transmission should be in part purely underground. There was fortunately located on the route selected, several sub-stations which were badly in need of additional energy and such other developments that the company had in mind, that it was decided to install a 23,000-volt 25-cycle system, it being felt that this was the limit of successful high voltage underground operation. Certain features presented themselves at this time which made it desirable to have the transformers delta connected. This feature was thoroughly discussed and at that time no serious objections presented themselves and it was put into operation the early part of the year of 1915.

Some trouble developed due to weak spots in cable and joints, but these faults were surprisingly low, considering the quantity of cables that were put into service at this time.

The system rapidly settled down to a successful continued operation and no faults developed that did not have a reasonable explanation, such as fault in material and joints, and joints not properly made.

Since correcting this condition the system has operated successfully with reference to the general plan, but a serious condition arose when a short circuit occurred, particularly disastrous to synchronous apparatus connected with the system, which would invariably fail by reason of the voltage drop occasioned by the severity of a short circuit on the delta system. The cables suffered severely, and in fact, in some cases the covers of the manholes blew off, taking on more the nature of an explosion if the short circuit occurred in the manhole.

It was then decided to change this transmission to a Y system with the grounded neutral. The transformers being constructed for delta operation, it was necessary to take the core out of the case, cut the coils apart and parallel them for 23,000 volts Y. A five ohm resistance was inserted, which afterwards was removed, thereby operating the neutral directly to ground. The results of a cable failure now have a decidedly different effect.

In some cases no superficial evidence is present at the point of failure, and when such evidence is present, it is not of such a severe nature as to destroy adjacent cables and in no way presents the disastrous appearance as when trouble would occur with a system operating delta.

It is true that by experience a better understanding of protective apparatus resulted in changes to such apparatus which were beneficial, but it was felt that the successful operation of this system was largely due to the change from delta to Y grounded.

The system has been in successful operation now some two years and is considered by this company as being successful in all points of construction.

Ontario Hydro Commission Report

The Hydro-Electric Power Commission of Ontario has just issued Volume II of their report covering the year 1918, which includes, among other rates and figures, the 1919 power and light rates for the one hundred and seventy odd municipalities at present supplied by the Commission. As we receive frequent requests for these figures, we are printing them in this issue in somewhat more compact form than they appear in the report.

There are comparatively few changes in either light or power rates from 1918. Indeed it may be taken for granted that, except in isolated cases, there will be few reductions. The changes, if any, are likely to be in the other direction. The cost of electric current is now so low in many parts of Ontario that it represents a negligible percentage of the cost —whether of manufacture or operation; whether domestic or commercial power or light. That being the case it is better that we should concentrate our energies on perfecting the service and popularizing the use of electricity, rather than on reducing its cost.

The A. C. Gilbert-Menzies Company, Toronto, state that the Wallace Lamp is now being put up in lots of one dozen in assorted finishes—brass, bronze, nickel and verde enamel.

Boiler Room Economy in Small Plants

By M. B. Watson, M.E.*

(Concluded from September 1 issue)

The loss of heat occasioned by chimney gases is usually very large because there is no outward method of telling the conditions under which the fuel is being burned and the fireman can not be checked up as he could with loss of coal among the ashes. To realize just what conditions are, special apparatus must be used, and chemical analyses of the chimney gases made. This need have no worry for the average intelligent engineer as will be shown later.

The greatest loss of heat from the stack is on account of the high temperatures of the gases leaving the boiler. About 14 pounds of air are required to burn completely one pound of coal. This air leaves the boiler at probably 600 degrees F. higher temperature than it entered the ash pit doors. It takes about one quarter of a heat unit (¼ B.t.u.) to raise the temperature of one pound of air one degree F. Thus 14 lbs. of air raised through 600 degrees will require 14 x 600 x ¼=2100 B.t.u's. If this quantity of air were raised through 1200 degrees, it would require about 4200 B.t.u's., or if double this quontity were raised through 600 degrees, it would require about 4200 B.t.u's. Thus we see that the heat carried away by chimney gases varies directly with the rise in temperature, and with the amount of air admitted to the fire.

In order to cut down our losses from Chimney gases, we must keep the temperature of the exhaust gases as low as possible, and cut down the air entering the furnace to the lowest point where we still get good combustion.

To accomplish the latter, the first thing to look to is to see that no air enters the boiler setting or furnace, except where it is required for combustion purposes. The boiler shell must be properly seated in the setting, and no air allowed to leak through cracks in the masonry nor between the boiler shell and the masonry. Also all cleanout doors, etc., must be closed as tightly as possible. Many an hour expended for needlessly polishing parts that show, could be used to better advantage in going over the boiler and setting and stopping up air leaks. Of course the remarks already made about even firing apply here, for a hole in the fire is worse than many large air leaks.

Before we dare cut down the amount of air admitted to the ash pit and the combustion chamber we must know whether the fire is already getting sufficient air to complete the combustion or not. As before stated this can only be determined by a chemical analysis of the flue gases. We will therefore have to look into the matter to see what to expect, and to know the meaning of the results of an analysis.

Only Nitrogen Should Escape

The exhaust gases from the chimney should consist mostly of a large volume of nitrogen, which is the part of the air which does not enter into the combustion, a small amount of moisture, and carbonic acid gas, or carbon dioxide, which is the product of the carbon of the coal completely burned and combined with the oxygen of the air. If too much air is admitted to the furnace there will also be a large quantity of free air in the chimney gases and the proportion of the other gases to the total will be much smaller than without the air. If insufficient air be admitted to the fire the combustion of the carbon will be only partially complete, and the chimney gases will contain a considerable proportion of carbon monoxide, which is the product when the carbon in the fuel is only partially burned with the air. This carbon monoxide is a combustible gas and if we allow it to escape through the chimney we are wasting heat which we might have used.

From the above it will be seen that if we can determine the amounts of carbonic acid gas and of carbon monoxide in the chimney gases, we will know whether our fire is getting too much or too little air. The result we strive for then is a high proportion of carbonic acid gas, as little as possible carbon monoxide, and as little free air as possible.

Appliances have been so simplified for such chemical analysis as will give the results required, that any engineer can, by following the directions given, analyze and interpret the results of the analysis of his own chimney gas.

The most convenient and one of the best pieces of apparatus for analyzing chimney gases is known as the "Orsat" apparatus. Investment in one of these appliances will more than pay for itself in a very short time in saving of fuel if the engineer becomes skilled in the use of it and will be guided by the results. By the use of such apparatus, engineers can learn more about the proper operation of the fires than if any other way. Of course when engineers are not equipped for this work, samples of gas can be taken and analyzed by a chemist. These samples should be taken as quickly as possible and note made as to whether taken just before or just after firing. If a sample be collected over a considerable period of time, it will, upon analysis, probably be found to contain both carbon monoxide and free air, as it contains some of the gases formed immediately after firing when there is insufficient air, and later when there is an excess of air. Naturally the results of analysis of such samples are useless. Samples must be taken quickly.

Automatic CO_2 Records

Engineers should impress on the owners or managers of their plants the necessity for, and the enormous saving which can be effected by, the use of such instrument, or even an occasional analysis of this kind done by an outside firm. In some of the larger plants automatic carbonic acid gas recorders are in use. These machines, while quite expensive give indications of the presence of too much air, but give no indication of the presence of carbon monoxide. However, once they are properly adjusted they run with practically no attention and give a continuous record of the proportion of carbonic acid gas thus indicating whether the firing has been regular or otherwise.

It is generally found that the proportion, by volume, of carbonic acid gas in the chimney gas can be as high as 12 to 14 per cent before combustion becomes incomplete and carbon monoxide appears if the firing is done lightly and frequently; while a considerable proportion of carbon monoxide may show itself with only 10 per cent of carbonic gas if the firing be heavy or irregular.

In general the carbon monoxide should not be allowed to exceed ½ or 1 per cent. by volume of the exhaust gases. Although the presence of carbon monoxide shows incomplete combustion and a need for more air, it is no guide to the loss of heat from this source, as there may be other combustible gases such as hydrogen or methane present which, although a loss of heating power, are not often measured.

The obvious remedy for large quantities of carbon monoxide or unburnt gases is to admit more air. The control of this air may seem at first sight to make more work for the fireman, but if done conscientiously will pay for itself in the smaller quantity of fuel and ashes to be shoveled, not to mention the cost of the fuel.

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Holes in the Fire

Holes in the fire is the most common cause of too much air in the flue gas, which is indicated by a low percentage of carbonic acid gas in the analysis, and is thus a great waste of heat. Frequent firing and the placing of the fuel on the thin spots is the obvious method of preventing the formation of holes in the fire. Firemen may, when operating under small loads, object to frequent firing, because the steam pressure rises to the blowing off point. This is, however, under the control of the fireman by means of the flue damper. When operating under light load, it is obvious that less fuel should be burned, therefore less air is required to be drawn through the furnace. As the bed of fuel is usually thinner under light load than under heavy load conditions, it will be seen that much less draft will suffice to draw this small amount of air through the thinner bed of fuel. The draft can be adjusted to the best proportions by adjustment of the flue damper. The damper regulator should be so arranged that the fireman can operate it from the floor in front of the boiler. A draft gauge, of which the simplest form is the water manometer, a U tube holding water in the bottom of the loop, one end of which is connected to the combustion, or the breeching on the fire side of the damper, the other end left open to the air, will be found of the utmost usefullness in the adjustment of the damper, as it will visualize for the fireman the effects of the movement of the damper. It also gives a good indication of the condition of the fuel bed. If the reading is too high there is either too thick a bed of fuel or else a dirty fire, or when too low there is too thin a fuel bed, or holes in the fire.

When using the damper it should always be moved gradually, as the sudden opening or closing, giving sudden changes of draft is most wasteful of fuel. The ash pit doors should not be used to regulate the draft, for the following reason. If there is too much draft and therefore the fuel is burning too fast and the ash pit doors are closed we will still have a strong suction from the chimney but very little air entering. We will then get incomplete combustion and a great deal of the available heat will be lost.

A thick bed of fuel tends to form crusts and high places, thus requiring more raking and slicing and losing a certain amount of coal, also during this operation cold air enters the fire doors and carries a great deal of heat away as well as putting great uneven strains on the boiler shell or tubes. It will also be found that a thin bed of fuel will form less clinker than a thick one. A good average thickness of fire for a hand fired boiler is 5 to 6 inches of coal on the grates. Thick beds of fuel increases the draft and consequently the air leakage through the fire doors, masonry, etc., while thin beds of fuel let more air than necessary through the fire, unless the draft is checked, heating up this air to no good purposes. From the above it is seen that the thickness of the fire should be kept as nearly constant as possible and the combustion regulated according to the steam required by use of the damper in the flue.

A Perfect Boiler

In a perfect boiler the gases of combustion would first come in contact with a part of the boiler where the temperature of the water or steam was the highest, following along, as the gases give up their heat to the water to the point where the water enters the boiler at a low temperature, leaving the boiler to pass out through the stack at the low temperature of the incoming water.

The above arrangement is of course impossible in practice but efforts are made to repass the hot gases over the boiler surfaces a number of times in order that they may deliver as much as possible of their heat to the water. If the baffles in a boiler are broken down or have holes in them, the hot gases take the shortest way to the chimney, and do not circulate around the surfaces of the boiler as intended; in this way they escape to the atmosphere at a much higher temperature than if they came in contact with more of the water-cooled surfaces. This under the above conditions only a portion of the hot gases are used in generating steam and much fuel is wasted.

Care should therefore be taken to see that all baffles are in perfect condition and the gases are conducted through the proper paths through the boiler.

Where to Look for Dirt

Since "Cleanliness is next to Godliness," we can no doubt find that it is of use to us in boiler operation.

If the ash pit be allowed to fill up it will be found that the amount of air passing up through the grates will be insufficient, causing the draft from the chimney to become stronger and causing large leakage of air where it is not wanted, at the same time giving incomplete combustion and heating up a lot of air needlessly. The grate bars will be found to burn away very quickly, both because of the heat reflected from the ashes at close quarters, and the insufficiency of cool air passing through and around them. This eventually means a shut down of the boiler and the expense of new grate bars. It is thus of the utmost economy and importance to keep the ash pit clean, as well as to keep the fire clean as we noted previously.

The next place to look for dirt is the fire surfaces of the boiler itself where it collects in the form of soot, dust and ashes. This is easily removed by means of blowers or brushes, as long as it has not been allowed to remain too long in place on the boiler surfaces, and will well repay one for the small amount of work required, if done frequently.

It has been stated by various authorities that a coating of soot one sixteenth of an inch thick on the fire surfaces of a boiler increases the fuel requirements under given load by about 59 per cent. Thus it is less work for the fireman to clean his tubes than to handle all this extra coal and ashes.

When coal containing much volatile matter is burned, there is always a considerable quantity of soot deposited on the tubes and fire surfaces of the boiler, and frequent cleaning of these surfaces is the only way to get efficiency from the boiler. When wood or anthracite coal is burned there will be very little soot deposited, but a great deal of dust and ash is always carried by the draft into the combustion spaces and settles in the tubes, etc. It is just as important to remove this dust as to remove the soot.

The inside or water surfaces of the boiler is the next place to examine conditions. All firemen are of course familiar with scale and sediment in boilers; also many are far too familiar with so called "Boiler Compounds." A little thought will dispel many peculiar notions about scale and sediment. Soft sediment in a boiler is usually the result of mud and sand carried in by the feed water, settling to the bottom of the boiler. This is easily gotten rid of by blowing down at intervals, depending on the amount of dirt in the water.

Scale on the other hand is formed by the precipitation, or settling out of solution, of certain mineral salts contained in the water; chief sulphate, or gypsum. These salts, and some others, have the peculiar property of being precipitated when the temperature of the water is raised. Thus when water containing these salts is heated, they are precipitated out of solution and form a hard scale on the surfaces where the heat is most intense, generally uniting with any soft sediment that may be present forming the whole into a hard scale, in the same manner as lime unites with the sand in ordinary lime mortar, which adheres closely to the surfaces of the boiler just at the points where the greatest water heating effect should take place.

There is no need here to do more than remind engineers of the enormous waste of fuel occasioned by deposits of scale on the water surfaces of the boiler, also the danger consequent upon the scale becoming thick enough to prevent the water keeping the plates or tubes cool enough not to burn or soften and warp.

The object of any so-called "Boiler Compound," or chemical treatment of the boiler feed water, is to change the chemical composition of these salts to a soluble form, so that they will remain in solution in the water instead of being deposited as a scale. These salts in good solution can be drawn off from time to time by blowing down, and entirely gotten rid of when the boiler is emptied.

The writer has met firemen and even high grade operating engineers, who have picked up, probably from advertisements of cheap boiler compounds, some sort of hazy idea that these compounds will take the scale forming out of the water. Now the only place, except the blow off cock, where anything goes out of the boiler is the steam pipe or safety valve. It is obviously not possible for these salts to go off in the form of steam, as may be demonstrated by boiling a kettlefull of salt water to dryness when the salts will still remain.

The process in an ordinary boiler may be likened to the old time method of making maple syrup, where, as the kettle of sap was boiled down, more sap was added, continually keeping the kettle full, until finally a thick syrup was left, part of which would crystallize into sugar if the evaporation were continued further. Thus in a boiler, although we may be able to keep most of the salts dissolved, we finally come to the point where there is such a thick salt solution in the boiler that further boiling will make the soluble salts settle out. By repeated blowing down of the water in the boilier we get rid of part of this thick solution replacing it by thinner solution of new water, thus extending the time when the above condition is reached. However, boilers should be completely emptied as often as possible, in non-condensing plants.

The kinds and quantities of chemicals to use for keeping the scale forming salts in solution can only be determined by a chemist, by analyzing the feed water. The chemist can then advise exactly what quantity of each of certain chemicals should be added per thousand gallons, or pounds, of raw feed water. Of course, condensate from exhaust steam does not contain these salts, so the make-up water only should be allowed for in condensing plants. This necessitates a metering device of some kind for the feed water or make-up water as the case may be. The chemicals should preferably be added continuously in proportion with the water, but daily or even semi-weekly additions of the chemicals are better than large quantities at long intervals of time.

There are numerous testing and chemical companies who will make analyses of boiler feed water and advise as to the treatment at a very small charge. Some chemical manufacturers make a specialty of this kind of work, and make up special mixtures of "Boiler Compounds" to suit the individual conditions of the feed water in question. Great care should, however, be exercised in choosing firms of this kind, that they be thoroughly reputable, and that they publish the results of their analyses and the formulae of their compounds. Beware of all firms who keep these results and formulae secret, or of advertisers of secret formulae Boiler Compounds; as there are, or have been, firms who sell some cheap chemicals, disguised with coloring matter, etc., at ridiculously high prices under the name of Secret Compounds.

Firemen keeping clean fires and ash pits, doing carefull firing and draft regulating, and where possible analyzing their flue gases and regulating their fires according to the results shown, also keeping their boilers clean inside and out, will find they can make a great saving in the fuel bill, also a great saving in coal and ash handling which will well repay them for the extra work of close attention. Records in the form of log sheets will also be found of the utmost value in the operation of any steam plant.

Electric Furnace Operation in United Kingdom, 1918

By Mr. R. G. Mercer*

The author's main object is to give any information possible which may tend to increase the general efficiency of electric steel furnaces in this country.

There are installed or being installed 141 electric furnaces with a total capacity of 112,000 kv.a. Of these, 24 are or will be used for Swedish substitute, cupro-nickel, allundum, manganese copper, and ferro alloys.

The remaining 117 are electric steel furnaces having a total charging and kv.a. capacity of 384 tons and 98,769 kv.a. respectively, and a total nominal output of 31,170 tons per month, based on 5 days a week 4 weeks per month.

Assuming that all these furnaces are working at full load, the total nominal out put at the end of a year would be 405,000 tons. It has to be borne in mind, however, that some furnaces only work on day shift, others are shut down or not yet installed, and all those in commission have delays due to furnace or electrical troubles and shop conditions. These delays were in many cases very frequent and serious and are referred to below.

Electric steel furnaces are used for steel castings and ingots, and the following tables give particulars of each and the total number, capacity, etc., of each type of furnace.

It will be noted that the Heroult furnace (which was first in the field) heads the list so far as number of furnaces and capacity are concerned.

The Electro-Metals furnace which shows the next highest returns came on the market later.

The Greaves-Etchells, which was produced some time after the Electro-Metals, comes third on the list, and the Stobie furnace, which comes fourth on the list, has only comparatively recently been offered to the steel trade.

The Snyder furnace, which is used for making acid steel, has to rely largely on the steel maker's requirements as to whether he wants to make acid or basic steel.

The two furnaces marked "Special" were made by the user.

Table 1.

Electric Steel Furnaces in the United Kingdom

Made	Number of furnaces	Total tons, size	Total kv.a.	Nominal Tons output per month
Electro Metals.	27	73	20,274	6,740
Greaves-Etchells . . .	26	64½	18,830	5,680
Heroult	45	180½	43,220	13,760
Rennerfelt	4	7	1,895	750
Snyder	6	9½	3,150	1,200
Special	2	2	750	280
Stassano	2	2	600	240
Stobie	5	15½	10,050	2,600
Total	117	384	98,760	31,250

The nominal output in tons per month is based on 5 days a week, 4 weeks a month, and the rated charging capacity of the furnace.

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*From a paper read before the I.E.F.

Table 2.—Castings
Electric Furnaces for Castings (Installed).

Make	Number of furnaces	Tons, Size	Total kv.a.	Tons output per month Nominal	Actual
Electro-Metals . .	13	25½	8,139	2,900	—
Greaves-Etchells .	4	7	2,050	700	—
Heroult	7	16	4,170	1,560	—
Rennerfelt.	2	5½	1,100	440	—
Snyder	6	9½	3,150	1,200	—
Special	2	2	750	280	—
Stassano	2	2	600	240	—
Stobie	1	5	800	400	—
Total	37	72½	20,739	7,720	5,019

It will be noted, however, especially in the case of 6-ton furnaces, that the actual charge is, in most cases, greater than the rated charge. This is more fully dealt with later.

Table 2A.
Electric Furnaces for Castings (to be Installed)

Make	Number of furnaces	Tons; Size	Total kv.a.	Tons output per month Nominal	Actual
Electro-Metals . .	1	2	800	280	—
Greaves-Etchells .	4	17	5,450	1,260	—
Heroult	4	10½	2,700	980	—
Stobie.	2	13½	3,250	600	—
Total	11	44	12,200	3,120	say 2,028
Grand total . .	48	116½	32,939	10.840	7,047

Table 3.—Ingots
Electric Furnaces for Ingots (Installed)

Make	Number of furnaces	Tons, Size	Total kv.a.	Tons output per month Nominal	Actual
Electro-Metals . .	12	39½	10,335	3,200	—
Greaves-Etchells .	10	14¾	4,710	1,570	—
Heroult	32	148¾	34,920	10,720	—
Rennerfelt.	1	2	600	240	—
Stobie	1	12	3,000	800	—
Total	56	217	53,565	16,530	12,906

Table 3A
To be Installed

Make	Number of furnaces	Tons, Size	Total kv.a.	Tons output per month Nominal	Actual
Electro-Metals . .	1	5	1,000	360	—
Greaves-Etchells .	4	22	4,900	1,650	—
Heroult..	1	3½	750	280	—
Stobie	1	15	3,000	800	—
Total	7	44½	9,650	3,090	say 2,410

The actual output giving the best month's output of each furnace is purposely taken and is 65 per cent. of the nominal output (see Table 2).

Assuming that the furnaces to be installed have an actual output of 65 per cent. in Table 2, the actual output per month would be 2,028 tons, making a total of 7,047 tons per month, or 91,637 tons in the ladle per annum, for castings, against a total nominal output of 140,920 tons per annum. It will be readily seen from the above figures that the furnaces are mostly working on day shift (see Table 2A).

The actual output would be 716 tons per month on the month's output of each furnace, and is 78 per cent. of the nominal output (see Table 3).

Assuming these had a ratio of 78 per cent. actual to nominal output as above, the actual output would be 2,410 tons per month (see Table 3A).

These furnaces represent those sanctioned by the Ministry of Munitions of War, and do not include those ordered since November, 1918, after which date sanction was not required.

Table 3B.
Furnaces (not Working) November 1918

Make	Number of furnaces	Tons, Size	Total kv.a.	Tons output per month Nominal	Actual
Greaves - Etchells	4	3¾	1,720	500	—
Heroult	1	2½	700	220	—
Rennerfelt	1	½	195	70	—
Total	6	6¾	2,615	790	say 716

The actual out put would be 716 tons per month on the above assumption.

Table 3c
Furnaces for Castings and Ingots

Class of steel	Number of furnaces	Tons, Size	Total kv.a.	Tons output per month Nominal	Actual
Ingots..	69	267½	65,830	20,410	16,032
Castings	48	116½	32,939	10,840	7,049
Grand total . . .	117	324	98,769	31,520	23,081

These figures go to show that, on the above assumption, we have in this country furnaces capable of producing a total possible output of over 300,000 tons of electric steel per annum with 98,769 kv.a. behind them.

Taking the average output per month over a period of time we get very different results, as follows:—

	Nominal	Actual	
Castings	7,720	3,557	46 per cent
Ingots	16,530	9,855	50 per cent

Successful Shawinigan Convention

The two days' convention of the Shawinigan Water & Power Co. at Shawinigan Falls was attended by 350 delegates The convention was an unqualified success. Mr. J. E. Aldred, president; Mr. Howard Murray, vice-president; Mr. Julian C. Smith, vice-president; Mr. W. S. Hart, treasurer; and Mr. F. T. Kaelin, chief engineer, were among those present.

The proceedings of the convention, held in the Technical School, and presided over by Mr. F. T. Kaelin, were brief, the speeches not occupying more than an hour. The talks were of an informal character. Mr. Julian C. Smith spoke on the importance of efficiency in business and labor, the methods of obtaining same in electrical industries, and its resultant effects on the business of companies. Mr. J. Morse dealt with the supervision of electrical plants. Mr. E. Vinet outlined the measures that the company is adopting for the protection of its employees against injuries and loss of life when working with electrical apparatus. It is proposed to give facilities for practical instruction in this work to employees. "Standardization of Materials and Construction" was the subject chosen by Mr. R. J. Beaumont. Certain points concerning the adoption of such a system were discussed by Messrs. E. B. McDonnough, of Quebec, G. M. Anderson, and W. C. Bean. Mr. C. P. Read pointed out the importance of choosing employees wisely.

The entertainment programme included races, dances, and a baseball game. Refreshments were served after the athletic meet, and the distribution of prizes won in the races took place. The awards consisted entirely of electrical devices.

The Jefferson Glass Company resumed work on August 18 after a shutdown of only six weeks. When the company closed for the summer season, it was not the intention to open up again till some time in September. However, we are advised that rush of orders demanded the earlier opening.

The 1919 Rates for Power and Light of Ontario's Hydro Municipalities

Municipality	Domestic Light			Commercial Light				Power				
	Per 100 sq. ft.	1st 3 kw.h. per 100 sq. ft. per kw.h.	All additional per kw.h.	1st 30 hr. per kw.h.	Next 70 hr. per kw.h.	All additional per kw.h.	Prompt payment discount, both Domestic and Commercial	Service charge per h.p. per month	1st 50 hr. per month per kw.h.	2nd 50 hr. per month per kw.h.	All additional per kw.hr.	Prompt payment discount
	c.	c.	c.	c.	c.	c.	%	$ c.	c.	c.	c.	%
Acton	3	3.5	1.75	7	3.5	0.7	10	1 00	3.6	2.4	0.15	10
Ailsa Craig	3	6	3	12	6	1.2	10	1 00	5.2	3.5	0.15	10
Alliston	3	5	2.5	10	5	1	10	1 00	4.2	2.8	0.15	10
Ancaster	3	5	2.5	10	5	1	10	1 00	3	2	0.15	10
Arthur	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Aylmer	3	5.5	2.75	11	5.5	1.1	10	1 00	4.9	3.3	0.15	10
Ayr	3	6	3	12	6	1.2	10	1 00	4.5	3	0.15	10
Baden	3	3.5	1.75	7	3.5	0.7	10	1 00	3.2	2.1	0.15	10
Barrie	3	2	1	4	2	0.4	10	1 00	3.6	2.4	0.15	10
Beachville	3	4	2	8	4	0.8	10	1 00	2.2	1.5	0.15	10
Beaverton	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.15	10
Beeton	3	6	3	12	6	1.2	10	1 00	4.9	3.3	0.15	10
Blenheim	3	5	2.5	10	5	1	10	1 00	4.9	3.3	0.15	10
Bolton	3	5	2.5	10	5	1	10	1 00	4.5	3	0.15	10
Bothwell	3	7.5	3.75	15	7.5	1.5	10	1 00	5.6	3.8	0.15	10
Bradford	3	6	3	12	6	1.2	10	1 00	4.9	3.3	0.15	10
Brampton	3	2	1	5	2	0.5	10	1 00	2.11	1.39	0.167	10 & 10
Brantford	3	2	1	3.5	1.2	0.12	10	1 00	1.67	1.11	0.133	10 & 10
Brechin	3	6	3	12	6	1.2	10	1 00	4.5	3	0.3	10
Bridgeport				Kitchener rate + 10%				1 00	2.8	1.8	0.15	10
Brigden	3	7.5	3.75	15	7.5	1.5	10	1 00	4.5	3	0.15	10
Brockville	3	5	2.5	10	5	1	10	1 00	6.8	4.5	0.15	10
Bullock's Corners and Greensville, ext.	3	4	2	8	4	0.8	10	1 00	2.8	1.8	0.15	10
Burford	3	6	3	12	6	1.2	10	1 00	6.8	4.5	0.15	10
Burgesville	3	5.5	2.75	11	5.5	1.1	10	1 00	4.9	3.3	0.15	10
Caledonia	3	3	1.5	6	3	0.6	10	1 00	2.2	1.5	0.15	10
Cannington	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.3	10
Chatham	3	3.5	1.75	7	3.5	0.7	10	1 00	3.2	2.1	0.15	10
Chatsworth	3	5.5	2.75	11	5.5	1.1	10	1 00	3.5	2.3	0.15	10
Chesley	3	5	2.5	10	5	1	10	1 00	4.2	2.8	0.15	10
Chesterville	3	5	2.5	10	5	1	10	1 00	4.2	2.8	0.3	10
Clinton	3	4.5	2.25	9	4.5	0.9	10	1 00	4.7	3.1	0.15	10
Coldwater	3	4	2	8	4	0.8	10	1 00	3.2	2.1	0.15	10
Collingwood	3	2	1	4	2.2	0.4	10	1 00	1.83	1.233	0.14	10 & 10
Comber	3	7	3.5	14	7	1.4	10	1 00	6.8	4.5	0.15	10
Cookstown	3	4.5	2.25	9	4.5	0.9	10	1 00	3.6	2.4	0.15	10
Creemore	3	7	3.5	14	7	1.4	10	1 00	6.4	4.3	0.15	10
Dashwood	3	7	3.5	14	7	1.4	10	1 00	6.7	4.5	0.15	10
Delaware	3	7	3.5	14	7	1.4	10	1 00	5.4	3.6	0.15	10
Dorchester	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Drayton	3	7	3.5	14	7	1.4	10	1 00	7.1	4.6	0.15	10
Dresden	3	5	2.5	10	5	1	10	1 00	4.7	3.1	0.15	10
Drumbo	3	6	3	12	6	1.2	10	1 00	4.8	3.2	0.15	10
Dublin	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Dundalk	3	4	2	8	4	0.8	10	1 00	2.9	1.9	0.15	10
Dundas	3	2	1	5	2	0.15	10	1 00	1.67	1.11	0.133	10 & 10
Dunnville	3	4	2	8	4	0.8	10	1 00	3.2	2.1	0.15	10
Durham	3	4.5	2.25	9	4.5	...	..	1 00	3.8	2.5	0.15	10
Dutton	3	4	2	8	4	0.8	10	1 00	3.6	2.6	0.15	10
Elmira	3	3.5	1.75	7	3.5	0.7	10	1 00	3.8	2.5	0.15	10
Elmvale	3	4.5	2.25	9	4.5	0.9	10	1 00	3.6	2.1	0.15	10
Elmwood	3	4.5	2.25	9	4.5	0.9	10					
Elora	3	3.5	1.75	7	3.5	0.7	10	1 00	3.5	2.3	0.15	10
Embro	3	7.5	3.75	15	7.5	1.5	10	1 00	7.1	4.7	0.15	10
Etobicoke Tp.	3	4.5	2.25	9	4.5	0.9	10	1 00	3.2	2.1	0.15	10
Exeter	3	5.0	2.5	10	5	1	10	1 00	3.9	2.6	0.15	10
Fergus	3	3.5	1.75	7	3.5	0.7	10	1 00	3.5	2.3	0.15	10
Flesherton	3	3.5	1.75	7	3.5	0.7	10	1 00	2.6	1.8	0.15	10
Ford City	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.15	10
Forest	3	7	3.5	14	7	1.4	10	1 00	7.1	4.9	0.15	10

Municipality	Domestic Light			Commercial Light				Power				
	Per 100 sq. ft.	1st 3 kw.h. per 100 sq. ft. per kw.h.	All additional per kw.h.	1st 30 hr. per kw.h.	Next 70 hr. per kw.h.	All additional per kw.h.	Prompt payment discount, both Domestic and Commercial	Service charge per h.p. per month	1st 50 hr. per month per kw.h.	2nd 50 hr. per month per kw.h.	All additional per kw.hr.	Prompt payment discount
Galt	3	2	1	5	2	0.5	10	1 00	2.	1.33	0.16	25 & 10
Georgetown	3	3	1.5	6	3	0.6	10	1 00	3.1	2	0.15	10
Glen Williams, ext.	3	5	2.5	10	5	1	10	1 00	3.6	2.4	0.15	10
Goderich	3	4.0	2	8	4.0	0.8	10	1 00	4.7	3.1	0.15	10
Grand Valley	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Granton	3	6	3	12	6	1.2	10	1 00	5.6	3.8	0.15	10
Guelph	3	2	1	4	2	0.4	10	1 00	1.867	1.267	0.16	25 & 10
Hagersville	3	3	1.5	6	3	0.6	10	1 00	3.1	2.	0.15	10
Hamilton	3	2	1	3.5	1.2	0.12	10	1 00	1.43	1.	0.143	30 & 10
Hanover	3	4.5	2.25	9	4.5	0.9	10	1 00	3.3	2.2	0.15	10
Harriston	3	5	2.5	10	5	1	10	1 00	4.8	3.2	0.15	10
Hensall	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Hespeler	3	3	1.5	6	3	0.6	10	1 00	2.11	1.39	0.167	10 & 10
Highgate	3	6.5	3.25	13	6.5	1.3	10	1 00	6	4	0.15	10
Holstein	3	6	3	12	6	1.2	10	1 00	5.2	3.5	0.15	10
Huntsville	3	5	2.5	7	3.5	0.7	10	1 00	2	1.4	0.15	10
Ingersoll	3	2.5	1.25	5	2.5	0.5	10	1 00	2.11	1.39	0.167	10 & 10
Kingston	3	5	2.5	10	5	1	10	1 00	3	2	0.15	10
Kitchener	3	2	1	4	2	0.4	10	1 00	2.133	1.33	0.173	25 & 10
Lambeth	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Listowel	3	4	2	8	4	0.8	10	1 00	3.8	2.5	0.15	10
London	3	2	1	4	2	0.4	10	1 00	1.867	1.267	0.16	25 & 10
Lucan	3	4.5	2.25	9	4.5	0.9	10	1 00	4.2	2.8	0.15	10
Lynden	3	5	2.5	10	5	1	10	1 00	4.2	2.0	0.15	10
Markdale	3	3.5	1.75	7	3.5	0.7	10	1 00	2.5	1.7	0.15	10
Midland	3	2.5	1.25	5	2.5	0.5	10	1 00	1.467	1	0.133	25 & 10
Milton	3	3.5	1.75	7	3.5	0.7	10	1 00	2.5	1.7	0.15	10
Milverton	3	4	2	8	4	0.8	10	1 00	3.5	2.3	0.15	10
Mimico	3	3	1.5	6	3	0.6	10	1 00	2.5	1.7	0.15	10
Mitchell	3	4	2	8	4	0.8	10	1 00	3.8	2.5	0.15	10
Moorefield	3	7.5	3.75	15	7.5	1.5	10	1 00	7.1	4.6	0.15	10
Mount Brydges	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Mount Forest	3	4.5	2.25	9	4.5	0.9	10	1 00	3.8	2.5	0.15	10
New Hamburg	3	3	1.5	6	3	0.6	10	1 00	3.1	2	0.15	10
New Toronto	3	3	1.5	6	3	0.6	10	1 00	2.33	1.56	0.167	10 & 10
Niagara Falls	3	2	1	4	1.5	0.15	10	1 00	2.2	1.5	0.18	50 & 10
Norwich	3	3	1.5	6	3	0.6	10	1 00	3	2	0.15	10
Oil Springs	3	5	2.5	10	5	1	10	1 00	4.2	2.8	0.15	10
Omemee	3	5	2.5	10	5	1	10	1 00	4.5	3	0.15	10
Orangeville	3	5	2.25	9	4.5	0.9	10	1 00	3.6	2.4	0.15	10
Ottawa	3	2	1	5	2.2	0.5	10	1 00	1.8	1.2	0.15	15 & 10
Otterville	3	7	3.5	14	7	1.4	10	1 00	4.9	3.3	0.15	10
Owen Sound	3	3	1.5	6	3	0.6	10	1 00	2	1.4	0.15	10
Palmerston	3	4.5	2.25	9	4.5	0.9	10	1 00	4.7	3.1	0.15	10
Paris	3	2	1	5	2	0.5	10	1 00	1.83	1.22	0.156	10
Penetang	3	3	1.5	6	3	0.6	10	1 00	1.67	1.11	0.133	10 & 10
Peterboro'	3	2.5	1.25	5	2.5	0.5	10	1 00	1.3	0.8	0.1	10 & 10
Petersburg, ext.	3	6	3	12	6	1.2	10	1 00	5.1	3.4	0.15	10
Petrolia	3	4.5	2.25	9	4.5	0.9	10	1 00	3.6	2.4	0.15	10
Plattsville	3	6	3	12	6	1.2	10	1 00	5.4	3.6	0.15	10
Port Arthur	3	2	1	5	2	0.5	10	1 00	1.75	1	0.1	10
Port Credit	3	3	1.5	6	3	0.6	10	1 00	2.8	1.8	0.15	10
Port Dalhousie	3	4	2	8	4	0.8	10	1 00	2.3	1.5	0.15	10
Port McNicoll	3	4.5	2.25	9	4.5	0.9	10	1 00	3.6	2.4	0.15	10
Port Robinson, ext.	3	3	1.5	6	3	0.6	10	1 00	1.8	1.2	0.15	10
Port Stanley	3	4	2	8	4	0.8	10	1 00	5	3	0.15	10
Prescott	3	4	2	8	4	0.8	10	1 00	2.8	1.8	0.2	10
Preston	3	2.5	1.25	5	2.5	0.5	10	1 00	1.67	1.11	0.133	10 & 10
Princeton	3	7.5	3.75	15	7	1.5	10	1 00	7.8	5.2	0.15	10
Ridgetown	3	5	2.5	10	5	1	10	1 00	4.8	3.2	0.15	10
Rockwood	3	4	2	8	4	0.8	10	1 00	3.9	2.6	0.15	10
Rodney	3	8	4	16	8	1.6	10	1 00	6.7	4.5	0.15	10
Sandwich (See Windsor)												
Sarnia	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.15	10
Seaforth	3	4	2	8	4	0.8	10	1 00	3.9	2.6	0.15	10
Sebringville, ext.	3	5	2.5	10	5	1	10	1 00	4.5	3	0.15	10
Shelburne	3	4	2	8	4	0.8	10	1 00	3	2	0.15	10
Simcoe	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.15	10
Smith's Falls	3	3.5	1.75	7	3.5	0.7	10	1 00	2.5	1.7	0.15	10

	Domestic Light			Commercial Light				Power				
Municipality	Per 100 sq. ft.	1st 3 kw.h. per 100 sq. ft. per kw.h.	All additional per kw.h.	1st 30 hr. per kw.h.	Next 70 hr. per kw.h.	All additional per kw.h.	Prompt payment discount, both Domestic and Commercial	Service charge per h.p. per month	1st 50 hr. per month per kw.h.	2nd 50 hr. per month per kw.h.	All additional per kw.hr.	Prompt payment discount
Springfield	3	8	4	16	8	1.6	10	1 00	7.8	5.2	0.15	10
St. Agatha				See Petersburg								
St. Catharines.	3	2	1	3.5	1.2	0.12	10	1 00	1.4	0.99	0.12	25 & 10
St. George	3	5	2.5	10	5	1	10	1 00	3.8	2.5	0.15	10
St. Jacob's	3	5	2.5	10	5	1	10	1 00	4.9	3.3	0.15	10
St. Mary's	3	3	1.5	6	3	0.6	10	1 00	2.9	1.9	0.15	10
St. Thomas	3	2	1	4	2	0.4	10	1 00	1.67	1.11	0.133	10 & 10
Stamford Twp.	3	3	1.5	6	3	0.6	10	1 00	1.67	1.11	0.133	10 & 10
Stayner	3	4.5	2.25	9	4.5	0.9	10	1 00	3.5	2.3	0.15	10
Stratford	3	2.5	1.25	5	2.5	0.5	10	1 00	2.5	1.7	0.15	10
Strathroy	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.15	10
Sunderland	3	6	3	12	6	1.2	10	1 00	4.5	3	0.4	10
Tara	3	4.5	2.25	9	4.5	0.9	10	1 00	3.9	2.6	0.15	10
Tavistock	3	3.5	1.75	8	4	0.8	10	1 00	3.1	2	0.15	10
Thamesford	3	7	3.5	14	7	1.4	10	1 00	5.6	3.8	0.15	10
Thamesville	3	6	3	12	6	1.2	10	1 00	5.6	3.8	0.15	10
Thorndale	3	7	3.5	14	7	1.4	10	1 00	5.6	3.8	0.15	10
Thornton	3	5.5	2.75	11	5.5	1.1	10	1 00	4.9	3.3	0.15	10
Tilbury	3	5	2.5	10	5	1	10	1 00	4.3	2.9	0.15	10
Tillsonburg	3	3	1.5	6	3	0.6	10	1 00	3.3	2.2	0.15	10
Toronto	3	2	1	5	2.5	0.5	10	$1.25 1st 10 h.p. $1.00 all add'l	1.5	0.5	0.15	20
Tottenham	3	6.5	3.25	13	6.5	1.3	10	1 00	6.4	4.3	0.15	10
Victoria Harbor	3	3.5	1.75	7	3.5	0.7	10	1 00	3.9	2.6	0.15	10
Walkerville	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.15	10
Wallaceburg	3	5	2.5	10	5	1	10	1 00	3.6	2.4	0.15	10
Waterdown	3	4	2	8	4	0.8	10	1 00	3.3	2.2	0.15	10
Waterford	3	4.5	2.25	9	4.5	0.9	10	1 00	4.2	2.8	0.15	10
Waterloo	3	2	1	4	2	0.4	10	1 00	1.67	1.11	0.133	10 & 10
Watford	3	7.5	3.75	15	7.5	1.5	10	1 00	7.1	4.7	0.15	10
Waubaushene	3	4.5	2.25	9	4.5	0.9	10	1 00	3.6	2.4	0.15	10
Welland	3	2	1	5	2	0.15	10	1 00	1.73	1.13	0.147	25 & 10
Wellesley.	3	4.5	2.25	9	4.5	0.9	10	1 00	3.9	2.6	0.15	10
West Hamilton, ext.	3	4	2	8	4	0.8	10	1 00	2.8	1.8	0.15	25
West Lorne	3	7	3.5	14	7	1.4	10	1 00	6.5	4.4	0.15	10
Weston	3	2.5	1.25	5	2.5	0.5	10	1 00	2	1.4	0.05	10
Williamsburg	3	5	2.5	10	5	1	10	1 00	4.2	2.8	0.3	10
Winchester	3	4	2	8	4	0.8	10	1 00	3.1	2	0.25	10
Windsor and Sandwich ...	3	4	2	8	4	0.8	10	1 00	3.6	2.4	0.15	10
Woodbridge	3	3.5	1.75	7	3.5	0.7	10	1 00	3.3	2.2	0.15	10
Woodstock	3	2	1	4	2	0.4	10	1 00	2.133	1.33	0.173	25 & 10
Woodville	3	6	3	12	6	1.2	10	1 00	4.5	3	0.4	10
Wyoming	3	5	2.5	10	5	1	10	1 00	4.2	2.8	0.15	10
Zurich	3	7.5	3.75	15	7.5	1.5	10	1 00	8.9	5.9	0.15	10

Personal

Mr. C. C. Bothwell, manager Canadian Laco-Phillips Co., sailed on August 30 on the Royal George for a business trip to England and Holland.

Mr. E. T. Garner, Ontario representative of the Jefferson Glass Company, Limited, sailed on August 17, per steamer Metagama on a business trip to England and the continent.

Mr. Matthew Graham, of the Montreal office of the Bell Telephone Company, has been appointed manager of the Bell Telephone Company's Kingston office in succession to Mr. J. A. Gorrie, Jr., who has been appointed manager at Ottawa, succeeding Mr. W. J. Cairns, appointed district traffic superintendent.

Mr. Harry M. Giles has been appointed general superintendent of the South Philadelphia works of the Westinghouse Electric & Manufacturing Company. Mr. Giles, who succeeds the late Oscar Otto, killed in an automobile accident last month, has risen from the ranks in the Westinghouse organization of marine erection, a position to which he was appointed by H. T. Herr, when the Electric Company absorbed the Machine Company.

Mr. F. D. Egan, former works manager of the Pittsburgh Iron & Steel Foundries Company, has accepted a position in the general engineering department of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Penn., where he will devote his entire time to the development of electrical apparatus for steel mill applications.

Mr. Arthur H. Morse, of London, Eng., has been appointed managing director of the Marconi Wireless Telegraph Company of Canada. According to a statement by Mr. Godfrey H. Isaacs, the managing director of the Marconi Wireless Telegraph Co., the Canadian copmany is to be reorganized, the capital of a millions shares of $5 each being reduced to $2.50 each, and 500,000 new shares of $2.50 each created. The parent company will purchase 400,000 of the new shares and liquidate the debt of the Canadian company to the English company.

Electric Railways

Status of the Electric Railway — Zone System of Fares Applicable to this Continent — Unit Fare Discourages Profitable Short Hauls

By Mr. Dugall C. Jackson*

However serious may be the direct financial disturbances arising if the extensive electric tramway systems in the country decline into bankruptcy, those effects are minor compared with the effects on the prosperity of the country that will result from a failure of systematic local transportation in the cities. The continuation of business in cities, whether industrial, mercantile or other, is dependent on systematic local passenger transportation being available, and the activities and comfort of the great majority of individual citizens are likewise dependent on systematic local passenger facilities. Such facilities must be preserved and enlarged in a character which will maintain them, adapted to the characteristics of the cities.

Most street railways have been organized and work under provisions of some agreement between representatives of a city and representatives of the stockholders. The principles embodied in these contracts are usually similar to those in short-time business contracts, but the conditions are different, and both city representatives and company representatives have been at fault in the past in not recognizing this fact. A company directorate which accepts an agreement to make a fixed fare within city limits which are not defined and may be largely expanded, places the company in a situation where the ultimate bankruptcy of the enterprise is likely to result in case the area of the city grows in large measure, and a city council which insists on such a provision promotes the ultimate strangulation of service as the city grows. But the difficulty has been to find a better way. With the advent of state public utility commissions, the execution of some of the provisions may have yielded here and there to judgment. But even then there has often been a failure to correlate the facts so as to bring out the essential meaning of the tendencies in the industry.

The introduction of supervision by public utility commissions was essentially a move which, uniformly and fairly applied, would result in providing good service at cost, when a fair return on the investment is included as part of the cost in addition to the ordinary daily out-of-pocket expenses. At the same time it affords opportunity for a street railway operated with particularly able, foresighted management and giving notably good service to profit through receiving a larger return on its investment than the average for the industry, since a regulating commission may use its judgment on the question of restricting the return. The present slogan for service at cost adds to this the additional feature of guarantee by the taxpayers of a return on the investment, associated with operation under public authority. This addition has been adopted in certain instances, but it introduces an inflexibility in the rate of return which may in the future prove unfair to one side or the other. Another solution is to add to the powers of the public utility commissions, giving them sufficiently extensive and experienced engineering and accounting staffs so that they can fully audit the companies' affairs and correctly advise the public in respect to the problems of extension and of operation, without actually undertaking the details of the management. This is a solution to which I believe it is important for your commission to give careful thought.

Our present street railway service is an outgrowth of horse car service which, naturally, dealt alone with the short haul, and the electric railway fares were chosen and fixed by habit on the basis of the horse car service. In that service, the investment per passenger-mile haul was less than in the modern electric service. In Massachusetts the general ratio of total investment to revenue passengers carried per year has gradually but unmistakably increased during the entire period since electrification of the street railways, and the density of traffic measured in revenue passengers carried per car-mile was less in 1915 than at the opening of the period. The service itself has been entirely changed by the introduction of the electric car, which made practicable longer hauls, so that a single fare was paid for hauls which previously cost the passenger two or three fares spent on connecting horse railways. The speed of transportation has also been raised and this has again increased the investment per passenger-mile-haul as well as certain factors of the operating expenses.

Since it is necessary to maintain both the short-haul and the long-haul traffic, it may be inquired whether the electric car is adapted to do this double service. The following considerations bear strongly upon this question:

Rail Lines Better Than 'Buses

It must be remembered that approximately one-half of street railway investment is fixed in the permanent way and adjacent pavement. This proportion has slowly increased during the past thirty years. The jitney buses which run at will on the street surfaces are free from this investment. True their owners contribute by taxes and license fees toward the cost of pavements, but so do the street railways in addition to financing the investment of their own permanent way which is used jointly by other traffic. Moreover, the street railways make heavy investments in power plants of the most economical character, which is a conservation policy as well as a policy for economy, and the jitney does not. These considerations make the jitney business more like other commercial enterprises in respect of the rapidity of turn over of capital and also enable it to compete with street car service operated with flat fares. It is important to examine carefully whether these considerations make the jitney bus lines with systematic routes and reliable schedules desirable substitutes or successors to the street railways, or at least to a part of their business, as has been asserted.

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*Professor of Electrical Engineering, Massachusetts Institute of Technology—Extracted from a statement before the Federal Electric Railway Commission at Washington.

What would be the effect on the street traffic congestion in cities such as Chicago, Baltimore, Philadelphia, Boston, and a large number of others, if the surface street railway service was replaced by bus service of equal reliability? Many of the American cities each have more than 1,000 cars operating on street railways during their rush hours. To replace such a service with buses would require several times as many vehicles, thereby adding to the welter of street traffic in the heart of each city. These vehicles would cause more than a proportionate addition to the traffic confusion because they would travel at will over the street, instead of being confined to certain definite channels like the street cars. Moreover, additional streets would have to be paved with smooth pavement at greater expense to support this bus traffic. This means a large increase of investment in paving, as well as annual cost for paving maintenance. Given equally systematic and reliable service by street cars and by jitney buses, community economy stands with the street car for service in main channels. The jitney may be made serviceable for certain special conditions. It should also be observed that the use of subways to divert some of the surface traffic from the surface in certain parts of the city, as is done in Boston and Philadelphia, and as is talked of in Chicago, Cleveland and elsewhere, would be less readily accomplished and less safe for railless traffic than for rail transportation. All of these considerations point to the fact that it is necessary under our present conditions of city life to maintain the rail traffic at a high degree of completeness.

Unit Fares Discourage Short Hauls

In my opinion, no amount of repressive regulation will be adequate to do away with the competition which jitney buses produce. It the street railway service cannot be made complete and adequate to the needs, some other service, such as jitney service, will come in as a competitor. In fact, it ought to come in and be encouraged unless means can be provided to make the street railway service adequate to the needs, and the necessities of the present are to find the best ways of making the street railway service adequate, in view of the fact that it is (with all things considered) the more economical service for the community.

After having studied carefully the conditions of local transportation in American cities under the normal conditions of cost prior to the war, I became convinced that a considerable part of the difficulties of the present street railway transportation sysems is due to their effort to satisfy the needs of long haul at the expense of the needs of the short haul. These conclusions are set forth in a statistical report on the subject, published in 1917 in a book entitled "Street Railway Fares, Their Relation to Length of Haul and Cost of Service" by Jackson and McGrath. In the first chapter of this book are set forth a summary and general conclusions. I wish to call your attention to seven paragraphs of specific facts regarding street railways which this investigation, in my opinion establishes.

1. Density of traffic is the most fundamental factor in establishing the cost of service per passenger. The higher the density of traffic, the lower the investment charges and operating expenses per passenger. In this connection density of traffic is a term used to mean passengers carried per car-mile run, and passengers carried per mile of track per annum.

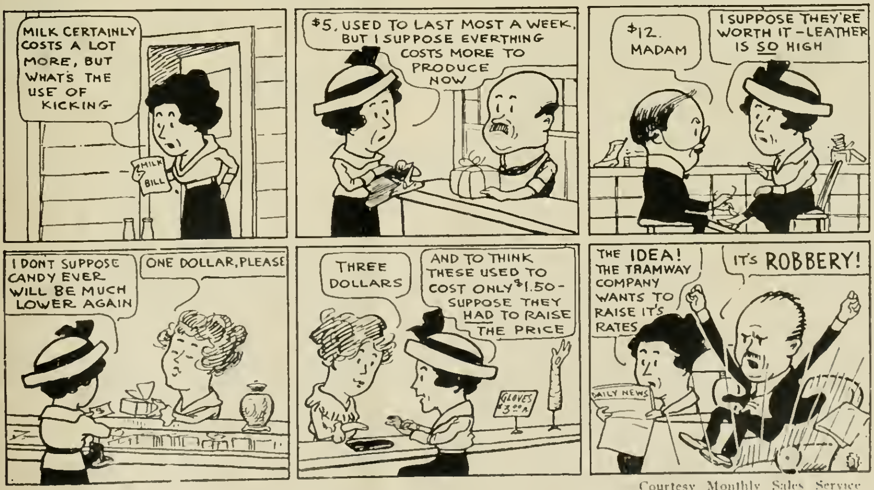
2. Long hauls tend to decrease density of traffic, thus decreasing the earnings per car-mile and increasing the cost per passenger.

3. The average length of passenger haul increases with the length of line.

4. The density of traffic becomes large in medium-sized cities, but as the cities spread out and become very large, the density of traffic tends to decrease again because of long hauls into thinly settled suburbs.

5. Increased unit fares have a tendency to decrease traffic, while decreased unit fares tend to increase traffic.

6. For a number of individual roads studied, as well as for the aggregate of all street railways in Massachusetts combined statistically as a single system, it has been found that the average actual investment per revenue passenger carried per annum has been increasing, and the average rate of return has been decreasing. This has been asso-


MILK CERTAINLY COSTS A LOT MORE, BUT WHAT'S THE USE OF KICKING
MILK BILL
$5, USED TO LAST MOST A WEEK, BUT I SUPPOSE EVERTHING COSTS MORE TO PRODUCE NOW
$12. MADAM
I SUPPOSE THEY'RE WORTH IT — LEATHER IS SO HIGH
I DONT SUPPOSE CANDY EVER WILL BE MUCH LOWER AGAIN
ONE DOLLAR, PLEASE
THREE DOLLARS
AND TO THINK THESE USED TO COST ONLY $1.50 - SUPPOSE THEY HAD TO RAISE THE PRICE
GLOVES $3.00
THE IDEA! THE TRAMWAY COMPANY WANTS TO RAISE IT'S RATES
IT'S ROBBERY!
DAILY NEWS

Courtesy Monthly Sales Service

ciated in the last few years (considering conditions prior to the European war only) with an upward tendency of operating cost per revenue passenger.

7. Fares in British cities are somewhat lower than on American street railways, and are almost invariably based upon the distance the passenger rides. In general they approximate (before the war) about 1 ct. (U. S, money) per mile and the average ride is usually only about 2 miles. Lower rates abroad may be ascribed partially to a greater density of population per mile of track, while wage scales are much lower in British cities than in this country and free transfers between lines are seldom issued.

[In addition to these seven specific facts, Professor Jackson quoted ten conclusions from his book, setting forth, among other things, that, in his belief, the street railways in the United States, both urban and suburban, would sooner or later be forced to adopt a system of rates based more nearly on the length of the haul. A mileage system of rates would probably be less desirable, in his opinion, than to retain the nickel fare by putting a reasonable limit on the length of the ride permitted for that rate. In general, he recommended, something shorter and more uniform than the present irregular and unsystematic 5-cent zones, possibly with lower unit rates than 5 cents.]

Zone Fares Should be Established

The foregoing conclusions all point to the necessity of some zone plan of fares for our large cities. Where it is pointed out in the conclusions that a mileage system of rates is probably not desirable in American cities, it is the intention to urge the fact that transportation, like other branches of business, has a certain proportion of overhead cost which is reasonably independent of the bulk of the business, and that, therefore, the short haul passengers may be expected to pay a larger fare per passenger-mile apportionment than the long haul passengers, and that the zone system should be laid out recognizing that fact. Zones which might have been based on a 3-cent fare under prewar cost, would, to-day, call for a 5-cent or larger fare.

Most of the street railways of the United States have wished to avert the introduction of zone fares, partially on account of the difficulty of adequately auditing the fares collected. In the European cities where zone fares have been used for several decades, the plan has been usually founded upon a straight mileage charge without consideration of the stand-by charges, and measures for adequate auditing have not been introduced. This is undesirable in American practice since we have a much heavier passenger flow which calls for larger loads on our cars and makes impracticable the collection of fares according to European methods. Moreover, the American public is more inclined to criticize loose methods of fare collection than the foreign public, and the American public has become more accustomed to methods of checking money collections in all lines of business, as is illustrated by the very general use of cash registers in the mercantile lines, than has the European public. Some of our American street railway employees suggest that the introduction of accurate methods of accounting for fares is a reflection upon the honesty of the platform men on the cars, but, in my opinion, this is an inaccurate inference in respect to the attitude of the true man. No true man can fairly object to the use of a cash register in a corner grocery in which he is employed as a clerk, nor in a department store where he is employed, as it puts him upon his mettle to do his work accurately and is to his advantage rather than his disadvantage if he is honest. Similarly accurate methods can be introduced in association with some fare collections on street railway cars. The passengers can rely upon paying only for that which they get in the way of transportation and can likewise rely upon the company receiving a full accounting from the collectors.

With the normal conditions of commodity costs gradually returning, as we may expect them to return ultimately, the unit fare may go below the nickel, so that a proportion of the passengers carried should pay less than the traditionally established nickel fare, while those passengers who travel larger distances will, and ought to, pay more than the nickel fare.

Zone Fares Reduce Congestion

Voice has been given to much well meant but incorrect criticism of zone fares for American cities. This has generally been based upon an allegation of population in the cities. My study has satisfied me that these premises are erroneous. The family that has gone to the suburbs for the purpose of obtaining better living conditions, as a rule, is able to pay a slight increase of fare without over-throwing its margin of advantages. If such fares are not increased above 5 cents provided the distance to the suburb is greater than a passenger can be carried for 5 cents, then the loss from carrying such passengers for 5 cents must be borne by others. If it is assumed by the state or city, the suburban dwellers will ultimately pay more than the extra fare, because we cannot escape the proposition that the general public pays for all such costs which are assumed by government, and that the cheapest way of meeting the costs is by direct payment, rather than the indirect payment through taxation.

Moreover, there are a large proportion of unskilled working people living in cities on whom the payment of even 5-cent fares falls heavily, and these, with their families, are now constrained to live in definite portions of our cities often denominated "slums," which are near the locations of centres of employment, because the individuals are unable to pay transportation charges and must live near their work. The zone plan, properly introduced at the present time, may not aid this portion of the population now, but with the gradual decrease of the cost of commodities and the consequent reduction of the price of transportation there will be an ultimate reduction of the unit price per zone, which will enable such passengers to get a certain amount of transportation at less than 5 cents per passenger. The ultimate result of the zone system introduced properly into American cities will improve the present situation by tending to spread the area within which it is practicable for unskilled working people to live.

Canadian Electric Railways Cannot Be Run "On the Cheap"

The U. S. Government recently appointed an Electric Railways Commission to gather evidence on actual conditions surrounding the operation of electric railways, with a view to dealing with the situation. Evidently the government has the idea of instituting such action as will best serve the public interest. They are taking care to hear all sides of the case—railway officials, the public and labor. It is the apparent idea that a poor railway service is dear at any price.

Unfortunately for the public good there are municipalities in Canada whose officials have no such broad gauge ideas. Things must be done on the cheap regardless of quality. The idea is that this plan pleases the public, and pleasing the public means votes. We do not believe, however, that this is the right policy. It is only fair that we pay for what we buy, and we all know that a street car ride costs the operating companies practically double to-day what it did five years ago. Why exact the last pound of flesh just because of franchise agreements that never anticipated war conditions? Why not play the game like a real sport—on the square?

The Contractor-Dealer

Solving the Servant Problem—It's Up To The Electrical Contractor-Dealer

There was a time when housewives needed to be convinced that an electric iron was superior to the old "sad"; that day passed long ago. Since that day, electrical devices, one by one, have been brought to such a state of perfection that they are now recognized without question as standard articles in household furnishings—toasters, vacuum cleaners, ranges, percolators, etc., etc.

And the procession still goes on. Up to the present the electric washing machine has been looked upon with hope rather than favor. It has taken this appliance longer to prove its real labor-saving qualities. Not that there has been any difficulty in selling washing machines—quite the reverse. Once you convince a housewife that it will do what is claimed for it the machine sells itself. But it now seems as if the pioneer work had been done and that this article, like those that have gone before, is now established as an essential—a real mother's help.

And now, next in line comes the ironing machine and the dish-washer. The field for both is unlimited. Both will get the kindliest possible reception and be given every chance to prove their worth. All that has to be shown is that they save labor—that is, save more than they create—and that they are dependable in operation. The latter should be simple and if the present models don't save labor there is nothing for it mut to correct the models. This, at best, will take a year or two.

Almost in the same class as the dishwasher and ironer comes the electric refrigerator. There is no piece of furniture in the home more frequently and constantly used. Three times a day, to and from the refrigerator—sometimes located in an almost inaccessible corner—always an expensive appliance to operate with the present-day high-priced ice—generally a nuisance to fill and messy at that—think, by comparison, of the luxury of an electrically operated refrigerator in the kitchen wall—ready to hand, automatically operated—a delight as well as a labor-saver to the kitchen worker.

Servants are scarce and getting scarcer; often inefficient and getting more so; generally independent and unreasonable in their demands and certainly not improving in this direction. The electrical trade holds the solution. There never was a richer harvest or a more urgent need for gathering in.

You Never Can Tell 'Till You Try

Many women are wondering if the Electric Washer really does—

- Save time.
- Save the clothes.
- Wash the clothes clean.
- Wash very dirty clothes.
- Wash the more delicate fabrics.

We tell you that the Electric Washer does all this and more—and scores of women can tell you that we tell the truth.

But find out for yourself. Let us install an Electric Washer in your home. You can use it, test it fairly and if it does not live up to our claims your money will be returned without the slightest trouble.

We'll put a (———) Electric Washer in your home, for $0.00 down and $0.00 a month—all on a money-back guarantee.

Call, phone or write today and arrange for the trial.

(Your Name and Address)

To be a successful contractor, or dealer, or both, you must be a good merchandiser, and to be a good merchandiser you must be a good advertiser. Here is an advertising suggestion that will arouse interest in the electric washing idea

How to Meet Competition From Non-Electrical Dealers

Every now and then a note of alarm and protest is heard from contractor-dealers regarding the inroads being made into what they term their legitimate business by the department stores, the hardware and the drug stores. Some talk of taking concentrated action against this development of the electrical merchandising business. Let us examine the situation a bit.

In the first place the sale of electrical merchandise cannot be restricted to any one class of dealers. You can sell other than electrical supplies, if you think it wise. The The question is, have you reached the highest point possible in electrical merchandising? If you have, more than likely you are so busy looking after your own business, and it is paying you so well, that you have no time or desire to go into other lines. There is a better way to meet the competition.

People have a habit of giving their business to the merchant who tends strictly to his own special line and does not waste time criticizing the other fellow. Therefore, the best way to meet this situation is for the electrical interests to concentrate upon their own wares; to drive home the message of "Do It Electrically" and "But It From an Electric Shop" to the prospects and customers of their community. The degree to which they do this will determine the amount of business which they will bring directly to the electric shop.

The non-electrical dealers have some advantages. They will sell electrical goods as more or less of a side line; to you these goods are your only foundation for profit. They will have prospects coming into their store to “shop.” Their windows will, no doubt, appeal to a greater number of people than your own. It would appear that they have the opportunity to display electrical merchandise to a greater number of people than you have. But opposed to these advantages you have others, equally as good, if properly used. People are inclined to buy electrical merchandise from the electrical shop. They will buy from you if you make it worth their while.

Intelligent Service

In the first place you should have the advantage of offering really intelligent sales service. In visiting an electrical shop people have the right to expect attention from salespeople who knew thoroughly the appliances which they are selling, who know the right appliance to suggest and who know what a given device will actually do under the right circumstances. The electrical salesman does not have to be technical and use language which the customer will not understand, but he must be able to explain a device to the customer in plain language.

Practically everyone likes to be waited on by a salesman who shows an intelligent understanding of what he is selling. This sort of sales service so far as electrical devices are concerned, is seldom found in the non-electrical competitors store.

Special Attention

You may have to make added effort to get customers into your store. To make it easy for women to buy from you, you must make your store interior and exterior attractive. Women expect certain things in department stores such as telephone booths, chairs, mirrors and something of a comfortable atmosphere. These things cost little and can just as well give your store the air of being easy to shop in.

Once having secured a customer, even if she bought only a 25 watt lamp, never lose sight of her. She knows where your store is; it will be easier for you now to get her back to purchase more. Follow up your advantage. Your non-electrical competitors have not the opportunities which you have in this matter of personal solicitation. You have the entry into the home—especially new homes—you contractors. You are frequently invited in whereas the other fellow has to invite the prospect into his store. Furthermore, few non-electrical merchants employ outside selling methods. Herein you have a wonderful field before you. Because electrical specialties, for the most part, must be sold—they must be gotten into the prospect’s home, demonstrated, and once that is done the sale is almost certain.

Buy at an Electrical Store

Therefore, instead of worrying about the “other fellow” concentrate on your own customers. Organize your outside sales force, brighten up your store and your windows; in your advertising, on your stationery—everywhere you can think of—feature the slogan—“Buy Your Goods at an Electric Store.” Get your fellow electrical merchants to do this and co-operate—for your own mutual benefit. The non-electrical dealers do not co-operate. You will have little resistance from that source.

“Service” Defined for the Electrical Contractor-Dealer

By Mr. T. N. White*

The term “service” has an extremely broad application. Its definition, as applied to any one field, is easily understood. You will, however, find difficulty in defining the word service. Broadly speaking, I would define it as “the delivery of something of value to both the giver and the receiver.”

Usually service in its commercial application is considered as modern. This belief is erroneous. Service has developed with trade and commerce. Wide-awake dealers and traders have always given service whenever it was of value to both their customers and themselves. The very fact that the word “service” has some eighteen definitions indicates its age. No modern word would have such a broad application.

Let us consider service as applied to Rural Power and Light. You may regard the “service” required by your contract as a necessary evil. As a dealer you claim that it is your business.

First: To interest a prospect in your plant.
Second: To sell the plant.
Third. To deliver the plant and collect your pay.
Fourth: To forget about this customer and devote your time to securing other sales.

This Schedule Leaves Out Service

This schedule leaves out “service,” and may be your idea of doing business. Is this the case in your instance Let us assume that this is your attitude and that you consider service is only of value to your customer. Is your idea correct ?

We claim that you are mistaken. Let us assume that you have 10,000 homes in your district. At least half of these are held by people who don’t want a plant, or will never have cash to pay for one. The remaining 5,000 may be considered as prospects. There are other dealers selling plants in your district, so you can’t expect to get all the business. Neither can you expect to interest all the prospects in one year.

Let us say that 5 per cent of the prospects can be sold in the coming twelve months. This means that 250 plants will be purchased in your district during the year.

There are other dealers, say two, who are energetic and right after the business. Maybe there are other less enterprising dealers who will get a little business. You should get your share, or about 25 per cent. This leaves the remaining 75 per cent. to be divided among your competitors. You get orders for about 60 plants. You may be satisfied with this or you may not. Your share of the business depends on your efforts. We have given you a very complete line of plants and you should be able to get a large percentage of the business in your district.

This covers one year. You still have about nineteen years’ work before you, as you must get your share of business from the 4,750 remaining prospects.

In addition to this new business, your old customers are going to want new plants in ten years or less. Some will require larger plants as they increase their load. The old customers are going to require lamps, flat irons, motors, repair parts for their plants and many other things.

Think this over. Just what is going to happen if you don’t give these old customers service. Not more than one third of the customers will stand the absence of service. They expect service to be supplied with this class of apparatus. Several Western Provinces have passed laws requiring service. Evidently manufacturers and dealers were not giving service so the customers had these laws passed. We can expect similar legislation here in the near future. Don't put yourself in a false position; your customers will make you correct your attitude or drive you out of the power and light business.

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*At Convention of Western Ontario dealers recently held in London, Ont., by the Northern Electric Company.

We have estimated that one-third of your customers are going to keep quiet and not cause trouble, but how about the other two-thirds. They are going around among their friends telling them about their troubles. The plant may be all right, but they don't know how to run it. They may need a repair part and you won't get it. There may be any number of little things that you could correct or explain and satisfy them, but you don't. These customers go around and give your plant and your business advertising of the worst kind. They won't buy from you again and they spoil your chances with prospects. They not only ruin your business but they give the entire power and light business a poor reputation.

We have considered what happens when no service is given. Now let us consider real service; how to give service and how to make service pay.

This Schedule Includes Service

Real service means simply keeping your customers satisfied. To be a satisfied power and light user your customer must

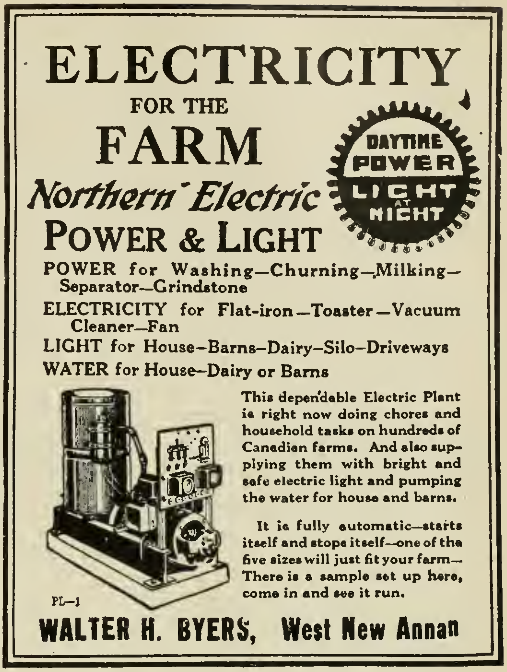
First: Have the plant installed on proper foundations in a suitable location.
Second: He must have his plant started properly and delivered to him in good running order.
Third: He must know how to operate his plant and keep it in good order.
Fourth: He must be able to secure repair parts quickly and at a reasonable price.
Fifth: He must have confidence that he can get help from you if anything goes wrong.
Sixth: He must feel that you take a personal interest interest in his plant and that your interest does not cease when you have made the sale.

How to Give Service

Start giving service just as soon as you get the order. Tell the customer that he must put his plant on a good foundation. All our plants run at a fairly high speed, and it is necessary that a good foundation be provided. We will furnish your customer with a foundation plan on receipt of the order. Poor foundations will shorten the life of a plant from 10 per cent. to 30 per cent. and increase repair bills 100 per cent. to 200 per cent. Get the foundation made at once. Your customer will want to run the plant just as soon as he gets it. If no foundations are ready the plant will be set up "temporarily," and it will, usually, never be changed. Poor foundations mean a constant call on you for service. Protect yourself by insisting on having good foundations.

Next instruct your customer about receiving the shipment. Warn him to examine the shipment carefully before signing for the goods. Knock a few boards off the crates and look the engine over. Examine each battery crate for indications of broken jars. Does battery crate show any signs of acid ? Open all battery crates showing acid and inspect the batteries for breakage. This examination should, if possible, be witnessed by the local freight agent. If goods are damaged sign for goods in damaged condition. Usually the agent will allow this examination before you sign. Sometimes they will make you sign first. If this is the case sign "subject to inspection," then make your examination. Call the agent at once in case of breakage. He is obliged to take note of your report in case of damage.

Help your customer with his claim. Our sales manual will soon contain a section covering claims against transportation companies.



ELECTRICITY
FOR THE
FARM
Northern Electric
POWER & LIGHT

DAYTIME POWER
LIGHT AT NIGHT

POWER for Washing—Churning—Milking—Separator—Grindstone
ELECTRICITY for Flat-iron—Toaster—Vacuum Cleaner—Fan
LIGHT for House—Barns—Dairy—Silo—Driveways
WATER for House—Dairy or Barns

This dependable Electric Plant is right now doing chores and household tasks on hundreds of Canadian farms. And also supplying them with bright and safe electric light and pumping the water for house and barns.

It is fully automatic—starts itself and stops itself—one of the five sizes will just fit your farm—There is a sample set up here, come in and see it run.

PL—1

WALTER H. BYERS, West New Annan

From the Truro, N.S., "News"—A sign of the times

Tell your customer to notify you just as soon as the plant is received and installed on its foundation. Then go to your customer's plant, check over the connections, and see that everything is in first-class condition before you leave. Before going question your customer to see that he has studied the instructions. Make sure that he realizes the importance of the instructions.

Carry a stock of small repair parts so that you can get your customer's plant started in case of breakage. Our warehouses will carry a large repair stock, but don't depend on this stock for your district. You cannot give real service unless you carry small small repair parts.

Don't delay in responding to calls for help. Get right on the job just as soon as you can. A quick response will help you to establish confidence and will please your customers. A customer with a baulky plant will soon develop a grouch and it may take weeks or months to overcome his unfriendly feeling.

Look in on Old Customers

When you are covering your district stop and see your old customers. Ask how their plants are running. Inspect the plant, check the gravity of the battery and run the engine. Check the operation of any automatic fixture and see that they are working correctly. If you find anything wrong suggest its correction or, if possible, make the correction yourself. Make your customer feel that your call is prompted by your personal interest in his plant.

How to Make Service Pay

You will, I believe, agree that service is of considerable value to your customer. Let us consider its value to you. There are two sources of income from service. The first, and least important, is the cash received for your time and material. We insist that you make no charge for your first visit that is at the time the plant is started. After this call your customer should understand that he must pay for your time and expense. Have this understood before you leave. Our new order blank will state the service conditions. There is one class of service that we may ask you to bill to us. Instruction books are supplied with each plant. If your customer finds trouble not covered by the instruction book, let us know at once, giving us all details. It is part of our service policy to see that all plants are supplied with full and complete instructions. We also wish to see that these instructions are so worded that the customer understands them.

The second, and most important, consideration is good-will. By giving good service you secure the customer's good-will. This is of more value to you personally than to us. It is something that no one can take away from you. If you change or increase the scope of your business this good-will will still be yours and will help you as long as you continue doing business in your district.

Before closing I wish to mention again the importance of calling on your customers and inspecting their plants. You can inspect a plant in ten minutes; a little more time will be required if you make adjustments and talk with your customer. Don't consider these calls as wasted time. By calling, you know the condition of all the plants in your district. You know where you can take a prospect to show him a plant. A well installed plant with a satisfied owner is your best bet. Get your old customer to talk with your prospect. A satisfied customer is your best salesman.

If you don't know the condition of the plants in your district you are liable to take a prospect to a dissatisfied customer. Use the best plants to exhibit. Never show a poorly installed plant to a prospect.

Try to have every plant installed so that it may be used as an exhibit. If one of your customers won't fix his plant, take him to a model installation. Make him ashamed of his own. One or two object lessons will usually result in an improvement.

Fundamentals of Electrical Merchandising

By Mr. W. L. Goodwin*

S. A. Chase and I have just completed a trip which started in New York and covered the entire country, including Canada. During that whole trip we failed to hear a single note of criticism against the business methods of the contractor-dealers. We found a material improvement in their credit standing, as well as in their moral standing.

Today the contractors have the interested attention of every other group in the industry, and you have proved your ability to carry through the tasks that you have set for the industry.

But, speaking in general terms makes it difficult for the average man to apply them to his daily business.

Better merchandising, or merchandising opportunities, are present on every hand, but for you to take them back to your home, and apply them, is the difficult thing.

The trade press of this country have done commendable work in carrying the message of better merchandising. But without your application of the ideas suggested, time has been wasted, and money uselessly spent.

In this travel around the country I ascertained that there is a keen desire on the part of those contractors into that branch of the business. Lack of men to man the institution, and lack of knowledge as to the correct thing to do, has caused many to hesitate upon embarking in the merchandising enterprise.

Notwithstanding that fact, however, some 350 stores have been opened within the past two years, with only one failure recorded, to my knowledge, and that is evidence, in my opinion, that we electrical men have acquired some ability in the conduct of retail stores. Merchandising, in itself, is a very simple thing to those who understand it. It has been said that people must possess a natural ability to conduct a retail business. That is true only to a certain extent. But with men of intelligence and experience, such as most of the men in the electrical industry are, I feel that we have the talent in the organization to carry for all time in the future, a satisfactory and complete public service on the part of the electrical people.

The Electrical Business for Electrical People

We find in this field of merchandising, the greatest opportunity for development. The way that the electrical men are taking hold of this problem convinces me that once more we have set a pace in merchandising that must be followed by other merchants, and that we are once more regaining to the electrical industry that part of the business which was fast getting away from the electrical people. We have, of course, no desire to drive from the business those concerns that take on our lines, as an incidental part of their business. But we do wish to establish practices in the trade that might well be followed by others.

If we accomplish the tasks set before us, in establishing proper policies, and rendering the right kind of public service, then we may be sure that this electrical industry, from the retail standpoint, will be preserved to electrical people. With that idea in mind we are going to present some of the Fundamentals of Merchandising.

The Crying Need

The most crying need, at the present time, is the maintenance of proper retail stores. That is perfectly obvious. And, next to that in importance, to my mind, is the need of improved packing methods—the improvement of packing to the extent that the commodities may be standardized and the cost of conducting the sale of them reduced to a minimum.

The products in the store of the average electrical dealer present a most miserable appearance, and it is utterly impossible for any electrical dealer to maintain a well-ordered store with the products now given to him, the facilities at his command for window displays being totally inadequate for the job to be done.

Proper Boxing Helps Sell Goods

Following that suggestion, several manufacturers have already started to study this question, and improve their packing methods. A few tests that we have made during the past six months may prove of interest to you.

A particular bell-ringing transformer, on display in a retail store in New York City, resulted, as the dealer reported, in the sale of only two transformers in a period of thirty days.

That same product, packed in proper packages, for a proper window display, sold 202 of these bell-ringing transformers in thirty days, proving conclusively that in the first instance the dealer had not been provided with proper facilities to sell the product.

If you contractor-dealers will point out to the manufacturers this opportunity to improve the method in getting their products to you, you will decrease your overhead expense.

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*Before Convention of the National Electrical Contractors and Dealers' Association at Waukesha Beach, Wis.

The most important feature in entering a retail business is location, as we will take occasion to point out later on.

Value of Good Location

The next most important feature is the selection and character of goods known to you, that are saleable in your community. A very good location, backed up by the most efficient management and knowledge of the business, will prove unsuccessful, if the merchandise offered is not saleable in the particular community in which the store is located. Local demands represents a large percentage of the opportunity for success.

> **Electrical goods should be "turned" six times a year at least. Eight and ten times is not uncommon. The quicker the turnover the fresher the stock, and, in consequence, the quicker the turnover. It's cumulative.**

The enjoyment of large demand does not necessarily mean greater net profits. Increased demand is of no value if the increase in compensation is offset by an even larger increase in selling expense. We should only require reasonable sales effort on the part of the dealer, to make a sale. Therefore, the manufacturers and jobbers must assist you in popularizing the product which they manufacture, in the community in which you operate.

And so you should give much consideration to what I call local demand—a knowledge of a particular product in the local community, and, so far as it is possible to do so, serve that product to your community.

Concentrate Your Business

Next in importance is concentration of business. Much time and money has been wasted by dealers, in an attempt to carry every conceivable product to take care of an occasional demand. Concentrated sales effort on the part of the dealer, on any line or lines that he may select, in my opinion, will produce the best results.

Co-operation of jobbers and central stations in your local community is vital to the success of any retail business.

Employees who have a knowledge of the electrical business, and are capable of answering such technical questions as the public might raise, are absolutely essential. To the degree that we acquire well-informed sales people, just to that degree will we maintain our competition with other merchants.

Read the Trade Papers

Keep posted upon every up-to-date idea. This can only be acquired by reading the trade papers. I would suggest that we consider it almost a religion—the necessity of reading, each morning, for not less than fifteen minutes, some good trade paper. We are more or less deficient in reading the very valuable information available through the medium of the trade press.

Next in importance, in the retail merchandising proposition, comes local newspaper advertising. We must acquire the habit of local newspaper advertising. It should not, in any way, be considered an additional burden, or expense. You cannot successfully conduct a retail store without local newspaper advertising. I would like to see the electrical industry acquire that habit, at a very early date.

The tendency on the part of dealers to argue with customers about goods that have proved unsatisfactory is a thing that should be eliminated. I believe we should adopt a slogan that no sale is made unless the customer is satisfied, and freely take back any article that may have proved unsatisfactory to the customer.

We should hesitate to sell to the consumer an article of unknown value to us. Merely because an increased margin of profit is offered is no reason for our selling goods of unknown merit. There are too many articles on the market of known merit, and the tendency on the part of dealers, after a line has been established and a popular demand created, when a new and cheaper line comes on to the market, to take on this new line, should be deprecated.

The public will purchase from electrical people because of the superior knowledge of electrical matters that, they believe, the electrical man possesses. Time alone will prove whether we are utilizing that superior knowledge to the best advantage.

Window Display Dealer's Biggest Asset

Perhaps the biggest asset of a dealer is the window display, which by no means is utilized to the maximum efficiency at this time. Facilities have not been provided to make the proper display, except in a few specialized lines. More important than an extra 5 or 10 per cent disconut is an attractive window display. Urge manufacturers to give you the facilities to display your appliances and materials, and utilize your window display. Follow the experience of the best merchants in your community—the department store. And bear in mind that the selection of the most desirable location in the community is the occasion for window display. A good store, in a good location, is of no value without an attractive window display. That is the biggest asset that you possess once you have established your location, and you should utilize it to its maximum efficiency.

Standard Plugs and Receptacles

The most important item that retards retail development, to my mind, at this time is the lack of standardization of wall, or convenience, receptacles—lack of standardization of plugs and receptacles on current-consuming appliances, such as toasters, flatirons, vacuum cleaners and other devices. That lack of standardization is due, solely, to the petty jealousies of the various manufacturers.

There is no medium that I know of that can enforce standardization of these things, except the contractor-dealer. I would like to see some action taken that would cause the manufacturers of this country to appreciate that they are retarding the growth of the entire industry by their petty jealousies and selfishness, in trying to put over their pet designs of receptacles.

> **Practically every one likes to be waited on by a salesman—not a "clerk." He must know his goods and be able to explain them in every-day language.**

We must first require a standard receptacle and then back it up with a campaign to rip out every wall receptacle in this country that doesn't fit that standard. Twenty or twenty-five years thereafter we must follow the example set by the manufacturers of incandescent lamps, and then, next we must do something to enforce, on the part of the appliance manufacturers, interchangeable receptacles. For intelligent men to continue, in these modern times, selling one or more dozen appliances, and requiring the purchaser to buy a different plug and provide a different receptacle for each one, reflects no credit upon our industry. Each plug and receptacle should be standardized, just as the incandescent lamp has been standardized. What the standard is I care not, and who suffers by the bringing about of such standardization I care not. Even those who may be first to suffer considerable loss in the bringing about of this change would reap their reward in compound interest in a very short time.

Save Time

I would like to see the contractors establish locally "customers' records," so that each consumer may be recorded as to the appliances in use in his home. Much time and a considerable amount of money is being wasted in useless selling and house-to-house solicitation, trying to reach consumers with devices that they have already purchased. In a number of communities in this country careful records are kept through the card system by dealers and central stations, and much time and money can be saved if such a record is kept.

We are wasting much time, and the time of the consumer in campaigns designed to interest them in, for instance, flatirons, when they already have one in use. If we have a knowledge of what the customer possesses, then we will apply intelligent salesmanship, and try to reach them with a device which we might sell to them.

Suggestions for Increasing the Sale of Electric Washing Machines—The Housewife in Average Circumstances is Your Best Prospect

The Society for Electrical Development, in its last issue of "Sales Service," gives some valuable hints on selling electric washing machines, intended to assist the individual contractor-dealer. It is assumed that you have an agency for some one of the many good washers. Having decided to go after the washing machine business, your first move should be to study the field.

What is Your Field ?

Into what class will your prospects fall ? Bear in mind that it is by no means always the wealthy who are the best prospects. On the contrary this class, being able to afford more servants, are often the poorest prospects. It is really the big middle class, the women who do their own housework, who will most appreciate the advantages of washing electrically. It is interesting to note that only about 15 per cent. of the families in this country employ servants.

Go to your central station and find out where the largest number of new customers are coming from Is there a new industrial development in your locality

Consider the real estate men. In one of the new additions in a certain large city electric washers and ranges have been installed in each house by the builders. Flats and apartments, contrary to some opinions, offer excellent opportunities for washer sales.

Classify the prospects, arrange them according to location and financial means and as far as possible group them. You will save your salesman's time and your own money if you concentrate on one district at a time. When you have made one sale in a block work hard on the other prospects in that street.

Never let an inquiry get "cold." When you get a live lead have it followed up promptly even if it is outside the district which you are working at that particular time.

Presenting the Idea

If you employ salesmen get the right kind. Insist on their representing you properly. Down-at-the-heel men are pretty sure to do you more harm than good. We will not go into the question of training salesmen here, but the manufacturers will be able to help you on that point and the Society will also give you assistance if you need it.

If you do not employ salesmen to any extent you must more than ever, depend upon the mails and other forms of advertising to do the preliminary selling work—to get the prospect up to the point where a demonstration or sale can be arranged.

The idea of washing electrically should be presented to the prospect as a distinct saving. Some women will have to be sold on the advantages of the electric washer, but you will probably find that a large number are already convinced that they would like to have a washer but cannot see how they can afford it. This brings us to the question of "easy payments" and it may be said in passing that the majority of washers will have to be sold on that plan.

The Price

The total selling price of an electric washer appears high —unless it is sold definitely on its performance before price is even mentioned. That price need not be a bar to sales is proven by a glance at some of the other articles which have sold in spite of price;

Kitchen Cabinet vs. Kitchen Table,
Electric Iron vs. Sad Iron.
Electric Cleaner vs. Broom.

The time payment plan should and will solve most of the price difficulties. We will not go into details of the various methods of financing time payment sales. It should be borne in mind, however, that the tendency is to reduce the length of the payment period. The good salesman will make the best terms possible and will aften be surprised himself to find that he can get cash in full.

There are not many people, even among those using electric washers, who appreciate the real saving in dollars and cents. Here is an argument which, with care, you can use on most any class of prospect.

Show How Washer Pays for Itself

With Electric Washer

Laundress, 1 day, wash and iron	$2.00
Her carfare	.10
Her meals, two	.70
Current for washing	.05
Cost with washer	$2.85

Without Electric Washer

Laundress, 1 day, washing	$2.00
Laundress, 1 day, ironing	2.00
Her carfare, 2 days	.20
Her meals, 2 per day	1.40
Wear on clothes (approximate)	.50
Cost without washer	$6.10
Cost with washer	2.85
Saving per week	$3.85

There is a saving in 52 weeks of the year of $169.00 or more than enough to pay for the washer. It should be noted that the wages of the laundress will be, in many cases, higher than we have placed them.

In this same connection the point should be made that it is often difficult to get a laundress at any price unless an electric washer is used. To the woman who does her own washing it may be necessary to convince her that her own time is worth something. She will save a day of her own time if she uses the electric, to say nothing of the relief from the most disagreeable of household tasks.

Therefore in selling, talk the labor saving (with or without laundress) the clothes saving because there is no rubbing; the time saving, because several pieces are washed at one time; the money saving, because requiring less time.

For every objection to the electric washer there are two good reasons why the prospect should use it. It is not necessary to give all the reasons here as all manufacturers' literature gives them. If the manufacturer puts out a sales manual see that every one connected with the selling of washers in your organization is familiar with it. You will get other favorable arguments from the users of washers right in your own town.

Efficiency in the Repair Business*

In being asked to take a part in this section meeting I was assigned the subject, "What Constitutes Efficiency in the Repair Business." I accepted this subject with certain reservations as the experience of my company and myself has been a long way from sufficient to have me begin to tell you all that goes to make up efficiency in the repair business, and therefore I believe my subject should be stated more properly as "The Importance of Efficiency in the Repair Business."

In the development of the contractor-dealer's business during the period of reorganization and readjustment since October, 1917, when Wm. L. Goodwin pointed the way to larger fields of endeavor and greater possibilities for us, there has come to many contractors the realization of the opportunities to be had in the sale of used and rebuilt electrical machinery and the repairs of this equipment. I shall not discuss the business of selling used machinery which our company has found profitable, but I want to give you briefly the result of our experience in repairing and rebuilding electrical equipment and to point out to you how important efficiency is in this line of work.

The repair shop of the contractor a very short time ago was not much more than the corner of the stock room. In some cases he had a small room set aside for this work, but the one or two men employed at that time did not appear to him of sufficient importance to provide these men with either the proper place or equipment so that they could make a showing that was at all comparable with the wiring and construction department. Our company passed through this stage of development and then we began to realize that by giving our machinery repair department just a small part of the attention the construction department was receiving that in a short time it began to show real results and looked like a paying proposition. We then turned our attention to the department with the idea that it should become as important a factor to our total business as the construction department. The plan we followed started out with a careful study of the best way to get machinery repair business and the proper way to handle it after we were able to get it. Our plan therefore developed as follows:

How to Get the Business

We found in this connection that three important factors were essential in going after repair business. It was necessary to: 1st, advertise in the local newspapers and the trade papers. The repair business is entirely different from contracting or merchandising in that the average consumer who needs your service has no idea of where he can go to get a good job of repair work done and in the case of the large industrial plant they usually have done their own repair work, or sent it to the repair shop of the manufacturer of their electrical equipment. We found also an excellent advertising medium was a series of letters sent to the customers, enclosing advertising blotters. The third and most important fact in the How to Get the Business Plan we found to be a good live salesman, whom we sent out to sell what we termed as electrical repair service, and we found by carefully following up our advertising we were able to get business from companies who formerly had told us they were not in the least interested.

A salesman of this service need not call oftener than once a month on the larger plants and once in 60 days on the small plants. By persistently following this plan you can get your share of the repair business in your community. Now that you have the business the next part of the scheme is to be able to handle it properly and efficiently. It is even necessary for you in some cases to give better service, certainly a prompter service than the manufacturers' repair shop, if you expect to hold the business of the plant or customer who has felt he was fairly well taken care of before you sold him. It is therefore of primary importance to have a good organization. You need a manager of the repair department, some one who will be held entirely responsible for the proper handling of the work and this party, may be at the same time your salesman. We found the duties of the manager and salesman combined nicely and worked out much the same as in our construction department where the department manager is responsible for getting all business and supervising the work after we get it. It is necessary also to have a service man who can assist with the purchasing of the repair department materials. Then, most important in your repair shop organization is the foreman of the shop who must be a man of practical and technical experience, a good executive in handling men and a person who is willing to co-operate with your other people. It is necessary also to have a good stock man and a careful accounting and billing department. Promptness and accuracy in sending invoices make the repair business a pleasure because a large part of the work is labor, and all repair business should be handled on a strictly cash basis.

We found further that a most important adjunct to our organization was proper forms for making records of each job we handle and we have developed in the following order a customer work order, the confirming order, the repair shop order, identification tag and shipping tickets. The importance of your organization is in a measure secondary to the proper equipment of your shop. We have found that the right kind of equipment such as coil winding and taping machines, a baking oven and coil dipping tanks, etc., are an absolute necessity in a shop that expects to be any factor at all in the repair business because without the equipment the work cannot be efficiently handled and if not efficiently handled it is not profitable. It is therefore necessary to invest a considerable sum of money in the proper kind of equipment, and for this reason no contractor should undertake to go into the repair business who has not the capital to make this investment.

I have now briefly outlined what our company has found a necessary part of handling the repair business along efficient lines. There are many details that I have not touched upon which enter into the conduct of the repair business, but I have tried to show you how all important is the matter of efficient organization and equipment to this business.

Griffiths Bros., manufacturers of paints and varnishes, were very busy during the war on Government orders, but are now settling down to cope with the export trade, and have already made several shipments to Canada. During the war the company manufactured for the War Office a new paint for guns that would stand the tremendous heat resulting from incessant firing and that was not affected by corrosive gases and hard weather conditions. This paint is now largely used for commercial purposes, and is a great success.

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*A paper presented by Mr. C. T. Jamison, of Milwaukee, at the 19th Annual Convention of Electrical Contractor-Dealers.

An Educational Exhibit

A novel scheme is being tried out by the Van Dorn & Dutton Company of Cleveland, in an endeavor to educate the public, both technical and non-technical, in the value and use of their equipment. Right on a prominent bank corner in the centre of the city this company have obtained permission to place a quantity of their equipment and maintain it in operation in full view of the public. For example, in the photograph shown, spiral bevel-geared generating machinery is shown in the actual operation of cutting gears from forged steel blanks. There is also on exhibit an extensive panel board showing various transmissions, differential and timing gears for automobile and tractor use, also miscellaneous spurs, bevels, spirals, wormwheels, racks and sprockets, etc. It is said that this model demonstration is daily drawing large crowds composed of every class of citizen. It is, evidently, a feature to be commended, both from an advertising point of view for the company and an educational point of view for the citizen.

Outdoor display by the Van Dorn & Dutton Company, of Cleveland—Commendable both from an advertising and educational viewpoint

Seven Cent Fare in Montreal

Montreal tramway fares are again raised, due to an increased wage schedule. The straight fare is advanced from 6c. to 7c., 4 tickets for 25c., instead of five; workmen's tickets, five for 25c., instead of six. The new tariff will give an average fare of 5.8c.

The annual report of the Tramways Commission states that the number of passengers carried during the twelve months was 249,062,211; paying passengers 183,350,928; transfers, 65,711,288; gross receipts per passenger, 3.47 cents; gross receipts per paying passenger, 4.72 cents; receipts per passenger (transportation of passengers only), 4.63 cents; total operating costs and taxes per paying passenger, 3.64 cents.

The report adds: It is interesting to compare the statistics of Montreal traffic during the last four years. It is pointed out that the total expenses of operation and taxes during the fiscal year 1915-1916, which were $3,707,053 have been augmented during the fiscal year, 1918-1919, to $6,672,140. In other words an increase of 80 per cent, or nearly three million dollars while the transfer receipts have not increased more than thirty per cent.

The Commissioners in fixing the new fares base their calculations on increased traffic, it being necessary to find $12,000,000 to meet all charges during the present fiscal year and to meet a deficit made between February and June this year. The total receipts for last year were $8,483,137.

Canadian Goods Wanted in England

Mr. F. I. Spielman, of Spielman Agencies, has just returned from a business visit to England, particularly in connection with the firms which he represents on this side. General conditions, he states, are such that it is difficult for manufacturers to make firm quotations and to promise definite deliveries. A great improvement, however, is now in sight, and Mr. Spielman is confident that it will not be long before Great Britain gets down to a satisfactory basis. The industrial unrest after all is not surprising, in view of the upset which resulted from the war. British manufacturers are keen to cultivate business with Canada. Canadian goods are in favor in Great Britain, but they will have to he paid for partly bp the purchase of British products.

The British Aluminium Co., for which Mr. Spielman is the representative in Eastern Canada, has made, he said, astonishing development. The company is prepared to take care of all orders for Canada and a large stock is held in the warehouse in Toronto.

The Ward Leonard Electric Company, Mount Vernon, N. Y., manufacturers of Vitrohm, vitreous enamelled, resister units, lamp dimmers, rheostats and electrical controlling devices, announce the removal of the office of their Philadelphia representative, W. M. Tompkins, from the Commonwealth Building to the Bourse Building Machinery Exhibit, Philadelphia.

Polar Cub Vibrator

The A. C. Gilbert-Menzies Company, Toronto, are distributing to the trade the popular priced Polar Cub vibrator. This vibrator is built around the universal Polar Cub motor, with die cast frame and fitted with cord and plug ready to use. The motor is nickel plated, the handle being finished in black enamel. Each one is packed in an attractive carton and carries the regular Polar Cub guarantee.

He will give you electric massage

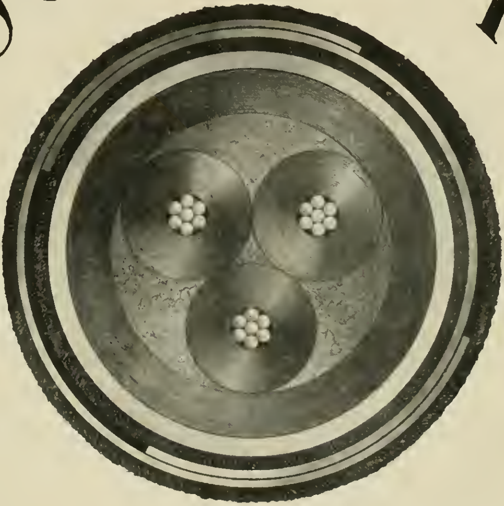
The British Ever-ready Co., after being engaged almost entirely on war work, are getting back to a peace footing, and have increased their equipment. The company has been engaged in developing battery sets for wireless telegraphy and telephony for aeroplanes.

The Canadian Linderman Company, of Woodstock, Ont., who carried on the manufacture of shells extensively during the war, announce that they will commence shortly the manufacture of unit electric light and power systems.

The Shawinigan Water and Power Co. have opened a New York office. The company have also a London branch.

PHILLIPS'

ARMOURED CABLES



No. 2 B. & S. 3-Conductor 25,000 Volt Cable

Paper Insulated, Lead-covered, Double Steel Tape Armoured

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The Quebec Railway, Light, Heat and Power Company

Eugene F. Phillips Electrical Works, Limited
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Branches: Toronto, Winnipeg, Regina, Calgary, Vancouver

Safety Enclosing Cover for Motor Controlling Rheostats

As a result of almost continual widespread "Safety-First" campaigns, the necessity for safeguarding all machinery and those who operate it, is now generally recognized throughout the realm of industry as a matter of vast importance. In the electrical field rapid progress has been made in the past few years in designing new lines of apparatus, redesigning old ones to make the safety feature more prominent, and particular attention has been paid to motor control device because, as a rule, this class of apparatus is handled either by unskilled labor or by those not familiar with electrical machinery, and the necessity for a fool-proof installation is the more obvious. It is interesting to note how the face plate rheostat, manufactured by the Westinghouse Electric and Manufacturing Company, shown in Fig. 1, is protected, and how the enclosing covers are so designed that they can readily be applied to old rheostats to make old installations strictly modern.

As shown in the illustrations the enclosing cover is a soild sheet steel box, which fits tightly against the rheostat base, and is secured by four corner bolts. Pivoted to the cover are two cast iron arms, one with the operating handle on the outside, and one within, made with a fork to engage the rheostat handle. To apply a safety cover to an old rheostat it is only necessary to remove the four nuts on the corner studs of the face plate and replace them with adapter nuts and studs, furnished with the cover. The rheostat handle is also removed and a fiber tube substituted. The cover is then put on so that the fork on the inner arm engages the insulating tube and the four nuts that were on the original rheostat are used to fasten the cover in place. The lead wires from the rheostat are brought through insulating bushings that are held in place by the edge of the cover. While no packing is used to make the cover water-tight, it fits so closely that it effectually prevents the entrance of metal chips, saw dust, or other material that would cause injury to the rheostat. The cover is grounded through the corner bolts and being insulated from live parts, renders it fool-proof and makes it impossible for an operator to accidentally receive a shock through coming in contact with the working parts of the face plate.

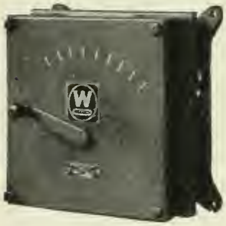

Fig. 1—Rheostat with Face Plate Cover attached

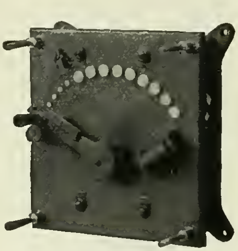

Fig. 2—Rheostat ready to attach cover, showing adapters replacing nuts, and fibre tube replacing handle

The use of these covers or similar devices is one of the important requirements of the modern factory or machine shop, and in some localities it is demanded by law. These covers fulfill all requirements of a safety-first device and are easily and readily installed.

For the ten months ending July 31 the earnings of the Southern Canada Power Co. totalled $487,847, a gain of $93,215, or 23.6 per cent. Operating expenses increased $40,147, or 18.3 per cent. leaving the net earnings at $228,881, an increase of $53,067, or 30 per cent.

Current News and Notes

Almonte, Ont.

The Electric Light and Power Commission of Almonte, Ont., have advised the town council to take steps to acquire the Wylie power plant, a privately owned enterprise, as an auxiliary to the plant already owned by the town.

Boston Creek, Ont.

The Northern Ontario Light and Power Company have entered into a contract to supply power to the Miller-Independence Mine where there is being installed new modern mining equipment to be electrically operated. The transmission line will run due east from Boston Creek, following a line half a mile south of the north boundary of the township of Pacaud.

Fredericton, N. B.

Proposals for the incorporation of the St. John Valley Electric Light and Power Company, a new organization, seeking rights in Victoria, York and Carleton counties, have been placed before the New Brunswick legislature. It is understood the new company's plan will be to secure power from the Maine and New Brunswick Power Company's plant at Aroostock Falls; erect pole lines and distribute primarily in the rural distrcts as well as in the towns and villages in St. John Valley from Perth to Woodstock. These districts are now without electricity, including Kilburn, Bath, Florenceville and Hartland.

Guelph, Ont.

The Wendigo Power Company, with head office in Guelph, Ont., has been incorporated for the purpose of developing hydro power on Wendigo Lake and certain parts of the Blanche River. The plant will be located about 20 miles south of Larder Lake and the ultimate development is given as about 4,000 h.p. The capital stock of the company is $1,000,000.

Montreal, Que.

Martel & Company, Limited, Montreal, electricians, have been granted a charter.

The Clarke Delorme Electric Supply Company, Montreal, have registered.

Ballard Brothers, electrical supplies, Montreal, Que., have registered.

Smiths Falls, Ont.

A new switchboard is being installed in the Gould plant of the Hydro-Electric Power Commission at Smiths Falls, Ont.

St. Angele, Que.

La Compagnie Electrique de Ste. Angele, Ltd., St. Angele, Quebec, have been granted a charter.

Stratford, Ont.

The new distributing station of the Hydro-electric Power Commission at Stratford, Ont., was opened on August 29.

St. Catharines, Ont.

A Canadian company—a consolidation of the Canadian interests of P. R. Mallory & Co., Inc., the Liberty Electric Corporation and the Abenderoth Company, all of Port Chester, N. Y., and P. G. Nichoff & Company, of Chicago—has leased the factory in St. Catharines operated during the war as a munitions plant by the St. Catharines Machinery, Limited. Tungsten products will be manufactured by the new company.

St. John, N. B.

At a meeting of the directors of the New Brunswick Telephone Company, recently held in St. John, it was decided to ask for an immediate increase in rates.

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A Contractor, Whether He Likes It or Not, is a Merchant

What is a merchant ?—A man who deals in some commodity—buys or sells it.

What is a commodity? Anything that may be bought or sold.

Name some of them.—Well, they may be divided roughly into two classes—(1) commodities that have physical properties, such as weight, dimensions, etc., and (2) more or less abstract commodities such as advice, experience, good will, accommodation, etc., which may be generally classed under the one heading—"services."

Then everybody is a merchant?—Assuredly. The grocer sells sugar; the doctor sells skill and experience; the engineer sells technical service. Every man and woman who receives pay from an employer, whether in the form of wage or salary is simply selling his "services."

A contractor is a merchant then, even if he doesn't call himself a dealer ?—How could he be otherwise ? Two or more contractors compete for a job· only one gets it. The best salesman—merchant. He was the one who displayed his wares—services—most attractively before the purchaser. The contractor who "bids" and neglects to follow up with "salesmanship," or "merchandising" stands small chance of winning out. The lowest price is not necessarily the most attractive, nor the highest the most impossible. "Service" jumps into the scales and may tip them one way or the other.

There is no excuse then for the contractor holding out against handling appliances on the ground that he is not a merchant. If he is making a success of selling his services as a contractor he has only to apply the same principles to the disposal of other commodities.

Sure, the contractor is, and ought to be, a merchant.

Good Illumination an Important Factor in Greater Production

It cannot be said that there are any notable advances in illumination to report within the past few months, although it is plainly evident that the importance of good and proper lighting is constantly receiving more general recognition. This is particularly true with reference to industrial lighting.

A review of the industries shows a very real improvement in conditions. As soon as the war closed the prime need became efficient production, and as this was impossible under any but the most favorable working conditions. engineers and lighting specialists found the managements of the various plants in a much more receptive mood than formerly. This is still, however, practically a virgin field where electrical contractors may confidently look for greatly increased business opportunities during the next year or two.

A number of new industrial lighting units have come on the Canadian market which represent improvements and refinements in the art rather than innovations. This tendency will doubtless continue.

The cost of lighting equipment during the war has increased like most other things, though not, generally speaking, to the same extent. This was due largely to necessary curtailment of production and to the enhanced value of raw material and wages. Present indications are that the highest peak of prices has been reached, so that it now only remains to get our production established on a heavier basis. This accomplished, the prices should gradually recede.

A very real menace to Canadian manufacturers of lighting goods and appliances—as also to manufacturers in other lines, no doubt—is the almost certainty that Germany will attempt to get her goods into Canada and undersell the home-made product. It was said a few days by an American manufacturer who was recently returned from that country, that Germany is today following the "sanest" course of any country in the world. His remarks had reference more particularly to the labor situation concerning which he added that whereas, on this continent, labor is demanding 10 hours' pay for 8 hours' work, the workman in Germany is willingly accepting 8 hours' pay for 11 hours' work. This may not be a commendable condition for the German workman, but we must all admit it is the spirit which will most quickly extricate that country from its tremendous load of obligations. However, it confronts the rest of the work with this conundrum—if Germany does not work long hours for small wages, how can she ever pay her debts, and if she does, how can other countries compete with her.

The labor problem thus remains in this, as in other industries, the key to the situation. With losses attendant on frequent strikes, added to the increased cost of production which follows when labor wins its fight, we would appear to be reaching a condition industrially that may cause a nation-wide collapse. It is little satisfaction that this collapse would also involve the workman.

We do not suggest that better illumination is a solution of all these problems, but we believe it can be justly claimed that it can be a big factor. The workman is demanding better working conditions—what adds to his comfort, whether in the factory or home, as much as more and better light? The workman demands big wages—this means that he must produce more in the same time, and what improvement in working conditions can have so potent an influence on greater production, as sufficient and proper illumination.

Good lighting may not solve the big problem of labor and industry, but given a fair trial it will get matters on a proper footing upon which a better understanding and a closer co-operation can be built.

The Possibilities of New Business Greater Than is Generally Appreciated

On another page of this issue, we describe the wiring equipment recently installed in a home by an Ontario contractor, which ran into something less than 3% of the cost of the home. It will be conceded that this equipment will take care of the needs of this householder according to the modern ideas of surrounding one's self with electrical luxuries and conveniences. However, one cannot but be struck with the comparatively small outlay demanded by this installation, on the one hand, and, on the other, by the large field it opens to the contractor-dealer to follow up and make sales. For example, running roughly over the situation—we understand this householder has already installed an electric range at a cost of about $250.00. That indicates that he is in the market for equipment of a good type, for example, a washing machine to cost $175; an ironing machine to cost around $400; a dish washer, $250; a refrigerator, $500; fixtures and floor lamps, $300; sewing machine, percolator, vacuum cleaner, cigar lighter, small heater, toaster, iron, etc., etc., probably to the extent of $200—a total of about $2,000.

Does the contractor-dealer in general appreciate the amount of business that lies dormant in every home that he equips properly? Here is a sufficient reason why he should use all his persuasive energies to make every installation he handles as complete as possible. Not only does it net him a bigger figure in the actual installation of the wiring, but it opens up a very much larger field in the years to come. Further, the big possibilities in electrical appliances also show very clearly the necessity of an electrical-contractor so fulfilling his first contract with the owner as to win his confidence and gain a reputation for good judgment.

Better Wired Houses The Only Way to Create Desired Demand

The success of any manufacturing industry is chiefly dependent upon the demand. The old method of doing business was to sit back and wait for the demand to develop. To-day the up-to-date business man reverses the operation—he sets himself to develop the demand.

There is no place in the business world where this up-to-date policy is more essential than in the retailing of household electrical appliances. The natural development of the demand has been fair, but has now reached a stage where there is a decided tendency to lag. The electrical industry is organized up to a point—the manufacturer is in a position to supply goods; the jobber is well organized; the contractor-dealer is coming. The weak point in the chain is the demand in the homes.

In the nature of things the development of a demand for electrical goods is more difficult than with other goods, for the reason that their use presupposes a properly wired home with all the necessary outlets so rarely found even in new houses. Householders by the thousands have a desire for electrical goods, but could not make use of them if they had them.

A lot of good money is going to waste in advertising and good energy in selling to supposed prospects who are not prospects in reality, for the reason that their homes are not so equipped as to allow the use of appliances. Yet in the face of this fact, ninety per cent. of the homes being built to-day have the wiring reduced to something below the "irreducible minimum."

Who is to blame? How can this condition be remedied? Whose business is it to remedy it?

Who is to Blame?

Answering these questions in order, we believe the architect and the contractor are equally responsible for the present state of affairs. In the first place, the architect doesn't understand the advantages of a properly wired home and in the second place, he is too entirely absorbed in attending to mere details of architecture, while he keeps the cost of the building as low as possible. The contractor, for his part, gives the lowest possible bid on the job, knowing that if he doesn't, some one else will.

How Can the Condition be Remedied?

The condition so far as the architect is concerned can only be remedied by a process of education. Every architect should be a booster for better wiring. His co-operation should be enlisted to the extent that he will bring a certain amount of pressure to bear on his client. He should consult with the electrical contractor and give his moral support to any suggestion for improvements the contractor may make. And the contractor—well, he must stop this silly competition to see who can get away with the cheapest job. Everyone knows the cause of this condition. It is the existence of a few irresponsible "carpet-baggers," with offices under their hats, who camouflage themselves with a coil of wire and a pliers to look like responsible wiremen, who have no reputation to lose, no capital at stake, and consequently nothing to gain by doing a better job than the poorest the law allows. This class must be got rid of. When this competition is finally removed, bona fide contractors must set themselves a standard up to which every house job should measure. Any contractor who fails to reach the standard on any job should be required to explain the reason of his failure to his fellow contractors.

Now is the time to feature small heaters and radiators. The evenings and mornings are cool. The use of electric radiators delays the need for the furnace.

Whose Business to Apply the Remedy?

Truly, the remedy of this weak point in our industry is everybody's business in the industry, for we all suffer. That is probably the reason why, in the past, it has been considered nobody's business. But we MUST get this stumbling block of poorly and inadequately wired houses out of the way. As already pointed out, the architect can do a lot of missionary work; so can the contractor; but the responsibility falls no less on the manufacturers and jobber. These two classes suffer most because the mouth of their distribution channel is closed and the channel becomes choked up in consequence.

Only One Solution.

There is only one solution—better wired houses. The architect can't do it alone—nor the contractor, nor the manufacturer, dealer or jobber. But, working together, they could organize and carry through such a campaign as would double and treble within a year the possibility for the use of electrical devices in the homes. Let us face the issue fairly. There is little difficulty convincing a man or woman of the luxury and utility of electrical devices. The real difficulty arises when we have to admit to him that he couldn't use them if he bought them.

Revision of Inspection Fees

The Inspection Department of the Hydro-Electric Power Commission of Ontario has issued a new set of prices, which will take effect October 1, as follows:

Incandescent Light Wiring

1 to 5 outlets	$1.00	
6 to 25 outlets	.15	each additional
26 to 100 outlets	.10	" "
101 to 200 outlets	.07	" "
and over 200 outlets	.05	" "

The above fees entitle contractor or applicant to one inspection only. Where service work and hardware is furnished by another contractor a separate application and inspection is required. Minimum fee—$1.00.

Electric Signs

Electric Signs, each	$1.00	
More than one sign on same building	.50	each additional

Motors

¼ to 10 H.P., each	$1.00
10 to 25 H.P., each	1.25
Above 25 to 100 h.p. each	1.50
Above 100 H.P., each	2.00
Over 550-volt, each motor installation	5.00
And each additional motor in same premises	3.00

Generators

Same charge as for motors of same rating.

Fixtures

Inspection of fixture installations will be charged for at half the rate of incandescent wiring scale, rating each fixture as an outlet; minimum fee to be 35c.

Special Inspections

For photographic, bell-ringing systems and arc lights, or where no special fee is provided, inspections may be made at the rate of $1.00 per hour, as well as any traveling expenses.

Special Theatre Inspection

A charge of $1.10 is to be made for the inspection of electrical apparatus and material on the stages of all playhouses before same can be used. These inspections to be made on Monday mornings by all district inspectors.

Permit Fees

A fee of 10c is to be charged for each and every permit.

Temporary Permit Fees

Temporary permits will be issued at a minimum charge of 25c. for every permit thus issued. Where special inspections are necessary in connection with the issuing of temporary permits a charge of $1.00 will be made to cover the inspector's time and expenses.

Refunds

Where more than one application has been filed in error for the same job, or where wiring contractor has overpaid the inspection fee through error or otherwise, the fee will be refunded, less 25c.

Ranges and Heaters

Each range or heater, including wiring thereto	$1.00
Each additional range or heater in same premises	.50

Where the above can be inspected along with wiring for the same contractor, the fee will be 50c. for each installation.

A Weak Objection to Safety Cars

The Trades and Labor Council, of Sydney Mines, N. S., have communicated to the Cape Breton Electric Company their disapproval of the system of pay-as-you-enter recently inaugurated. They point out that in stormy weather and particularly during winter months passengers will be subjected to annoyance and discomfort by having to take their turn in boarding the cars. Mr. Curtis, the superintendent, in his reply said that he welcomed constructive criticism and suggestions from the travelling public and patrons. The new system of collecting fares had the most advantages and the fewest disadvantages of any the company could work out. A passenger riding from one town to another prefers to pay his fare upon entering and not have to be bothered again. Mr. Curtis regretted very much that people should have been obliged to stand out in the rain even for one moment while waiting to board the car, but it was difficult for the company to furnish instantaneous shelter for prospective passengers.

Hydro Commission Issues Sixth Edition of Rules and Regulations

The Hydro-Electric Power Commission have just issued the sixth edition of Rules and Regulations for electric wiring. This book is bound in the same manner and is the same size as previous editions but contains many new illustrations taken from work in our own Province which indicate more clearly the methods which they are intended to cover. The book also contains much useful data at the back which was not in previous editions. All regulations to date are included in this sixth edition, including outlet boxes on knob and tube work which will come into effect on January 1st next.

We are advised that, as the Commission has distributed many thousands of these rule books gratuitously, it will be necessary hereafter to make a small charge for each copy. Copies may be obtained from any of the district electrical inspectors upon payment of 25 cents for each book. They will be available in any quantity not later than the first of October.

Sherbrooke Tramway Fares Increased

By a majority of 513 in votes and $3,725,810 in valuation, the ratepayers of Sherbrooke, P. Q., have passed a by-law amending the agreement with the Sherbrooke Railway and Power Co. This by-law, already passed by the Council, provides for an arrangement by which the city will do certain paving work, the cost to be reimbursed by the company. The fares are to be as follows: From 6 a. m. to 12 p. m., 8 cents, or four tickets for 25 cents; from 12 p. m to 6 a. m., 15 cents cash; children under 14 years, 4 cents cash or 8 tickets for 25 cents. These fares are to remain for 12 months, and are to be subject to revision every 12 months at the request of either the city or the company, the Quebec Public Utilities Commission to decide in case of disagreement. The company is free from the cost of snow removal for a period of five years. The company agrees to extend the system at once, and to double track a portion of its lines.

At the annual meeting of the Marconi Wireless Telegraph Co. of Canada, held in Montreal, the shareholders confirmed the appointment of Mr. A. H. Morse as managing director; Mr. J. N. Greenshields, president, and Mr. T. Robb, formerly general manager, vice-president The shareholders, at a special meeting, passed a scheme for reorganising the capital.

Comments on Illumination

By Mr. A. W. Shenton

All of us have a tendency to draw a more or less sharp distinction between illuminating engineering as set down on paper and as encountered in actual practice. We might say that there has been a tendency to classify illuminating engineering as of two kinds—first, the theoretical or text-book variety, and second, the practical variety. That these two are one and the same thing should be borne in mind by all of us and the only way technical treatises on illumination will have a practical value is by the reader being able to associate practical considerations with the material on the printed page.

To illustrate, an exposition on the importance of vertical illumination may be swallowed whole without having any future bearings on the reader's attitude toward this principle in practice. Let the reader, however, perform the simple experiment of working at a bench which we will assume is lighted in a manner very common, namely, by means of a good reflector unit hung directly over the middle of the bench. Now let him take a board and a square and mark this board to be sawed off square. He will probably have no trouble seeing satisfactorily to do this part of the work, for he will lay his board flat and will probably without conscious mental effort so place it that the shadow of the edge of his square will not interfere with accurate marking. Now, if he will clamp the board in the vise, with the marked surface facing toward him, and will try to follow his mark with a saw, once and for all the matter of vertical illumination will take on a new meaning which will endow any printed matter on the subject that later comes to his attention with a realness that fits in with personal experience.

If you are trying to write a letter at night in a room with direct lighting from open reflectors with clear bulb lamps and your paper is moderately glossy, you will, before writing many lines, realize the annoying effect of specular reflection in office lighting or industrial lighting. You will probably unconsciously shift your position so that the specular reflection is directed away from the eyes instead of toward them. Even in the milder case where you are writing on a dull finish paper, the specular reflection from the trail of undried ink following your pin point will be a source of considerable annoyance. The shadow or shadows, as the case may be, of your pen chasing across the page will further emphasize the need for diffusion in this case if your mind is open to the consideration of illumination principles as well as the more immediate object at hand.

If you go into some industrial plant where the lighting is not what it might be, and perform the simple experiment of taking your watch out of your pocket to see what time it is, you probably will encounter for a moment what workmen in the shop are obliged to encounter hour after hour. Probably the first thing you will do unconsciously and automatically will be to shift your watch so that the specular reflection of lighting units in the crystal will not interfere with vision. Try to read the time by means of the minute hand to an accuracy of, say, one-tenth of a minute, and you will know what a machinist in the shop is up against many times during the day. Stand off at one end of the factory and try to distinguish different objects and persons at the opposite end of the room. If direct glare from the lighting units is present to an objectionable extent, you will soon recognize its effects, and will find that it does not take a thorough-going illuminating engineer to recognize glare and its harmful effects. If the work being done in the factory calls for considerable work on polished surfaces, take a pocket mirror or piece of polished metal and see with what success you can duplicate with artificial light the stunt that the mischievous schoolboy does when he redirects the sun's rays into his teacher's eyes. If the stunt is successful and you are able to get a rise out of someone in the factory by so doing, you can set it down that the lighting installation does not fulfill the requirements of good illumination for a factory where work on polished surfaces is being carried on.

And so on, we might cite a number of simple experiments whereby one can build up his own theories of what constitutes good illumination, and when he refers back to the printed matter published on illumination, he may be surprised to find how closely his own findings will check with those of illuminating engineers who have written on the subject. In fact, the main difference between men who have become recognized as illuminating engineers and the rest of us is that they have cultivated this analytical frame of mind in regard to illumination and have reduced their findings over a number of years to printed theories on the subject. The articles thus resulting are very often considered dry reading simply because the reader is not able to connect them up with practical experiences of his own that coincide with the tenets of such articles.

Good Lighting Reduces Accidents, Improves Physical Condition and Speeds Up Production

"Insufficient and improperly applied illumination is a prolific cause of industrial accidents. In the past few years numerous investigators, studying the cause of accidents, have found that the accident rate in plants with poor lighting is higher than similar plants which are well illuminated. Factories which have installed approved lighting have experienced reductions in their accidents which are very gratifying.

"Of even greater importance, poor lighting impairs vision. Because diminution of eyesight from this cause is gradual, it may take the individual years to become aware of it. This makes it all the more important to guard against the insidious effects of dim, flickering light, of sharp shadows, of glare reflected from polished parts of the work. To conserve the eyesight of the working class is a distinct economic gain to the state, but regardless of that, humanitarian considerations demand it.

"Finally, inadequate illumination decreases the production of the industries of the state, and to that extent, the wealth of its people. Factory managers, who have installed improved illumination, are unanimous in the conviction that better lighting increases production and decreases spoilage."

A Few Examples of Weave Room Illumination in Textile Mills

By Mr. Kenneth A. McIntyre*

The time available, since the installations described below were completed, has been insufficient to permit of making tests of actual results secured in the several plants mentioned. Design data are not given because of the absence of test results for comparison. Remarks, for the sake of brevity, are of a general nature and the development based on experience leads to a conclusion applicable to most problems of industrial illumination.

Few industries require better illumination than the textile industry because of the fine and exacting nature of the processes. The attention centres in the weave room which is invariably the first point of attack in improving the illumination of any textile mill. Therein can be obtained the greatest results in increased production and improved quality of product. Textile machinery requires considerable floor space with the result that most mill buildings approach or exceed 100 feet in width, the weave room being usually on the ground floor. Thus artificial illumination is required down the centre of the building throughout the day. The vital factor of effective weave room illumination has resulted in the adoption, by leading mill engineers, of the plan of placing the weave room in a building or "Weave Shed," so called, by itself, one storey in height and with "saw-tooth" roof construction solely, to provide proper illumination during the daylight hours.

Less than ten years ago the "well lighted" weave room had at the most one drop light over each loom, using a carbon lamp usually with flat tin shade at a height directly opposite the eyes of the operator. Tungsten lamps reached a stage of reliability and were forthwith substituted for the carbon lamps in the same sockets and with or without the same flat tin shades, causing many times the glare because of higher intrinsic brilliancy—with consequent greater eye-fatigue. The end was worse than the beginning. This condition obtained a few years ago in the weave room of Canadian Cottons, Limited, Hamilton, prior to adoption of the scheme shown in Fig. 1. The operator cares for looms on both sides of the aisle, therefore layout of machines consist of long rows of looms with alternate operating and back aisles. Sixty watt Mazda "B" lamps were used with Benjamin deep bowl type, enamelled reflector sockets. Units in operating aisles were placed between each pair of looms, approximately 8 ft. apart with mounting height of 8 ft. In the back aisles alternate units only were placed and at a mounting height of 10 ft. Despite the fact that the product consists mostly of dark-colored fabrics, the light on the work was greatly increased. Since installation the long runs of conduit in the operating aisles have been shifted lengthwise to bring the units in line with centres of looms to minimize shadows cast by mechanism of looms. Note the interference by multiplicity of shafting, pulleys and belting. Here again electricity can be called upon to improve conditions by use of individual motors or by under-floor drive, eliminating line-shaft drive, which, at its comparatively high speed keeps the cotton lint disturbed, spreading it everywhere, making breathing a difficulty and depositing lint on lamps and reflectors, reducing efficiency. In this case the dark-colored lint, if not removed frequently, would greatly impair usefulness of the system.

In Fig. 2 is shown an installation with similar characteristics in another mill for the same company in Marysville, N. B. After three years of operation the management express their satisfaction. More than 600 units are in use in this one room, showing excellent results enhanced by

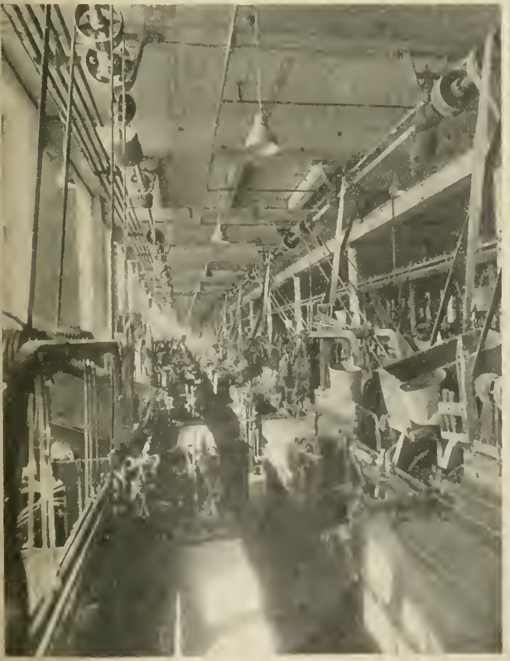

Fig. 1—Canadian Cottons Ltd., Hamilton

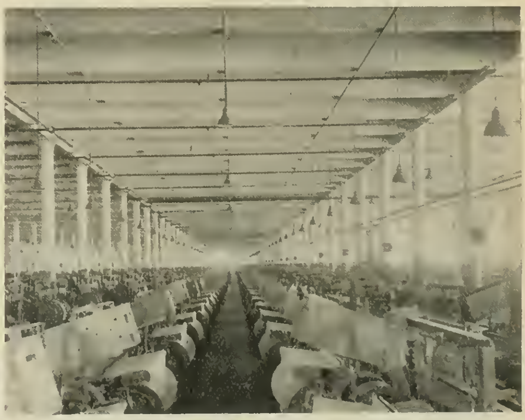

Fig. 2—Canadian Cottons, Ltd., Marysville, N.B.

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*Beattie-McIntyre, Ltd., Toronto.

favorable conditions of lighter fabrics produced and of under-floor drive. Contrast the mechanical conditions in Figs. 1 and 2.

A peculiar problem was encountered in the illumination of the weave room of the Oriental Textile Company, Limited, Oshawa, Ont., and solved as shown in Fig. 3. This mill produces high quality plushes and velours and weaving is affected by double shuttle looms weaving simultaneously two separate layers of fabrics with pile joining them. A special machine later cuts through this pile at right angles to it and makes two distinct pieces of velour or plush. Two warps are used mounted vertically one above the other, making a high structure with several layers of yarn through the harness of the loom. Shadows were to be minimized by either bringing the light from all directions or by providing portables to be carried as desired. Successful solution came with "eye-comfort" by use of National X-ray reflectors and fixtures. Two-hundred watt Mazda C-2 units are used on centres of approximately 14 feet. Ceiling is white and 12 ft. in height. The illustration was taken at night. The clear appearance of the ceiling is due to the adoption of individual motor drive. A further advantage is that machines can be moved without requiring changes in location of lighting units.

Fig. 4 illustrates the weave room of Imperial Cotton Company, Limited, Hamilton, recently completed. Five years ago the room was lighted similar to that shown in Fig. 1. The arrangement was similar but the looms in this case were nearly twice the width, the number of units considerably less. This disadvantage was somewhat offset by the nature of the product, principally white cotton duck. During the past year, however, the entire plant has undergone extension and rearrangement. In the weave room all the new looms installed are equipped with individual motor drive with advantages already mentioned. The new lighting system was designed by the engineers, Lockwood, Greene & Company of Canada, Limited, in conjunction with the writer. Benjamin deep bowl enamelled reflectors are used with 200 watt bowl frosted Mazda C-2 lamps. Alternate rows are staggered and spacing is on 16 ft. centres, along the diagonals. Mounting height is 12 ft. Bowl frosting is used to reduce the little direct glare. Control of light, as in the other examples given, is switches located in distributing panels. Circuits are arranged parallel to windows so that only necessary inside circuits are in use during the day.

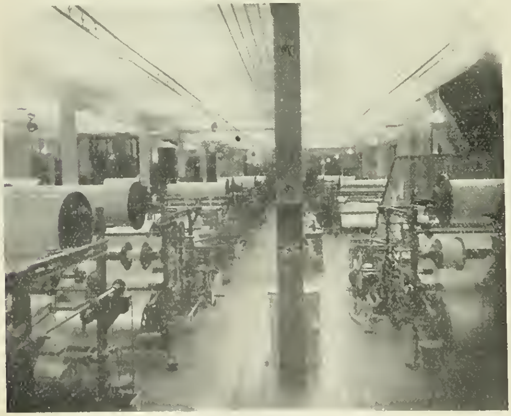


Fig. 3—Indirect lighting in Oriental Textiles, Ltd., Oshawa

In conclusion, a system of general illumination is desirable not only in weave rooms but in most industrial plants. Special auxiliary lighting can be devised where really necessary. The Mazda C-2 lamp with its larger and more efficient units makes general illumination commercially practicable and increased production will repay, over and over again the investment in properly designing a new installation or remodelling an old one. Machinery can be located at will without it being necessary to consider the lighting. The lamps are beyond the reach of an accidental jar or a nimble hand.

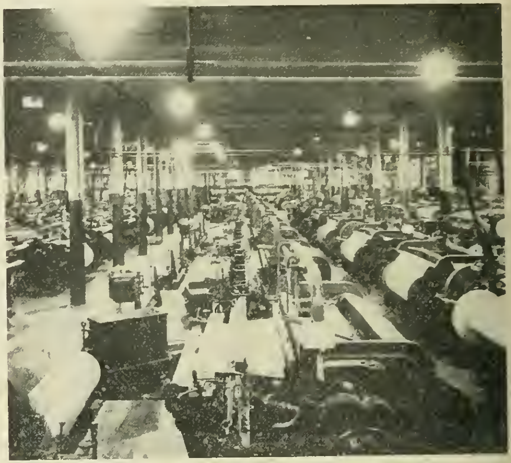


Fig. 4—Imperial Cotton Co., Ltd., Hamilton, Ont.

Letter to the Editor

Toronto, Canada, September 11th, 1919.

Editor Electrical News:

I have read with some considerable interest the paper published in your issue of September 1st, by Mr. John G. Learned. I notice in this paper that the words "extra outlet" are used throughout. It would appear to me that the use of this term is an unfortunate one. When building a house the one thing we all dread is the word "extra" or "extras." It would appear to me that there is very much more chance of the electrical contractor being successful in obtaining orders from his clients to put in the very necessary outlets, if he used some such words as "utility outlet" rather than "extra outlet."

Yours very truly,

S. L. B. LINES.

Owing to a falling off in miscellaneous revenue and higher fixed charges, the annual statement of the Quebec Railway, Light, Heat & Power Co. shows a deficit of $65,274, compared with a profit of $95,307. The gross revenue increased by $279,768 to $2,077,621, and operating expenses by $208,792 at $1,444,516, the net operating revenue being $633,105, a gain of $70,977. The board for the current year is constituted as follows: Lorne C. Webster, president; Hon. D. O. Lesperance, vice-president; Chas. Lavigne, L. J. Tarte, Arthur Picard, Paul Galibert, T. S. Stewart, M. P., Brig.-Gen. A. E. Labelle, Senator Jules Tessier, J. N. Greenshields, K. C., and C. G. Greenshields.

Canadian Electrical Dealers Realizing the Necessity of Attractive Stores—Two Fine Examples

[One of the finest electrical stores west of Winnipeg is "The Electric Shop," of Saskatoon, Sask., situated at 150 Second Avenue North. Mr. D. F. Streb, manager of "The Electric Shop, is a strong believer in making his electric store so attractive and efficient that the public is unconsciously drawn to it. This is undoubtedly the proper way to eliminate the competition of hardware and other general stores which is doing the electrical industry so much harm on account of their lack of knowledge of and sympathy with things electrical. We are glad to be able to reproduce some photographs of Mr. Streb's store and a brief description of its lay-out and the principles underlying the merchandising policy of "The Electric Shop." The salvation of the electric industry hinges on just such stores as this one.—Editor.]

The success of a retail electrical store involves the same principles and common sense methods that go to make any retail store successful.

The store should be so arranged that it will have a home-like appearance, be convenient for the public to enter, the merchandise so displayed that it will have an appeal to the customer, and be kept perfectly clean and dustless with all nickeled ware and parts well polished, and easy chairs located at convenient places for the ladies to sit down and feel at ease in selecting merchandise and making purchases. Your goods must be well displayed and to the best advantage, easy to show and demonstrate.

You must be well versed in all merchandise you handle so that you can point out its merits and answer all questions put to you by your customer in plain English language, and not pour forth a lot of technical terms, which will confuse your customers and render it more difficult for them to make up their mind to buy.

Our policy in purchasing goods is, of course, to sell them, and in order to be able to sell them with confidence we buy what we believe are quality goods and nationally advertised as we find that nationally advertised goods move more readily and require less time to sell.

Should any article not prove satisfactory to any of our customers, we either replace it or make a satisfactory adjustment, and this policy we carry out not only in selling merchandise but also in making repairs or any construction work that we may do.

Our customers are cordially greeted upon entering the store, are treated with tact and courtesy while in our store and whether they purchase or not are treated with the same cordiality upon leaving, so that on the whole we aim to leave the customer with a pleasing impression and a desire to return.

With a brief reference to prices, these are the same to all customers as we have one price only and that is marked plainly on the article.

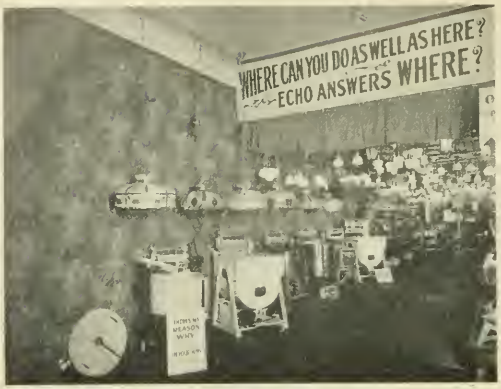
The Electric Shop of Saskatoon has an attractive appearance to the passer-by

We advertise two or three times each week in the evening paper, the amount of advertising being consistent with our gross turnover per year.

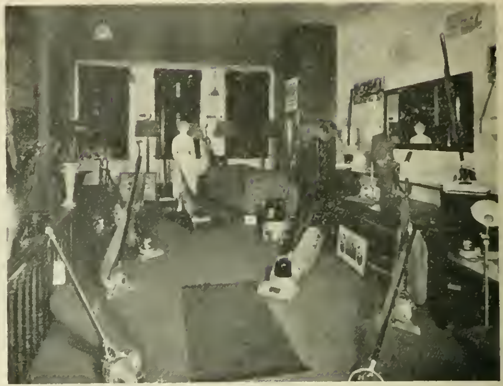
We do not have any special sales stunts but are quietly and constantly at our oars, and leave no stone unturned that will help to popularize our store and make it the headquarters for things electrical.

We believe that square dealing, quality and satisfaction will bring success to any store if consistently adhered to and

Interior views of The Electric Shop, Saskatoon. Mr Streb has the faculty of so placing his goods that they sell themselves and at the same time suggest other purchases



Popular Priced Electricians, Hamilton, Ont. Perhaps a little crowded, but very effective



Popular Priced Electricans, Hamilton, Ont. Everything in full view

that price is not the determinating factor, as the cut-rate store will sooner or later succumb to the inevitable.

With a brief reference to the layout of our store, you will note that we have two glass show cases and one counter with a show case front. In this counter show case front we have displayed various small articles which are kept in the drawer cabinet directly behind. This drawer cabinet has about 90 drawers in which all small articles are kept conveniently at hand for quick service. The back of the show case counter we use for receipts and wrapping paper.

Under the drawer cabinet we have six large drawers in which are kept lamps and various cords.

The next back wall case is arranged for lamp cartons and irons while the following two cases have sliding doors in which all nickel ware is displayed. Underneath these three wall cases are kept surplus stock.

On the opposite side of the store is a vacuum cleaner stand with a rug in front for demonstrations, two glass shade displays and, in the rear, portable lamps.

The first glass shade display is arranged with lights underneath the shades, while in the shelves underneath our surplus stock is kept.

You will also note that all the cases are about two feet apart for the purpose of displaying a floor lamp.

In the center of the store are tables for displaying heating appliances, etc., while washing machines and ranges are displayed toward the rear.

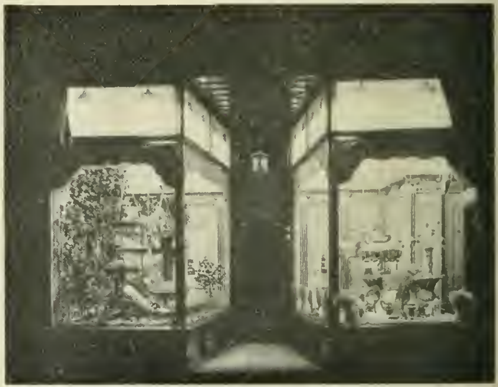
Our fixtures are hung on twelve-inch boards suspended two feet from the ceiling.

We find this arrangement of the store as a whole very convenient, making it easy to serve our customers. Another point is that we are able to see all over the store from any point, the same being true of the customer.

Hamilton is Also Noted for Its Attractive Electric Stores

The "Popular Priced Electricians," 203 King Street East, Hamilton, have an attractive store and good windows, as shown by the illustrations herewith. Still more important, they take fullest advantage of these assets in bringing customers into the store and interesting them after they get in. They always try to maintain clean, attractive window trims and store interior. They also advertise extensively in local papers. Since commencing business, in June, 1916, in a very humble way, they have, through their aggressiveness, been wonderfully successful, having increased their floor space at different times. Only lately they moved into their present home, which occupies a prominent corner on one of the main streets of the city.

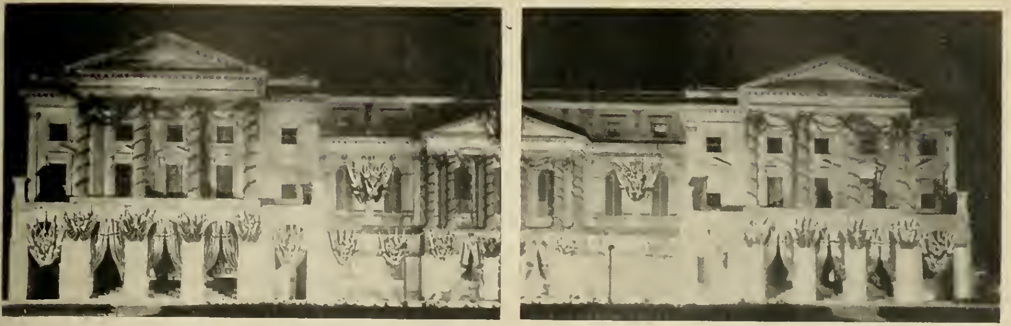
This firm carries a good variety of nationally advertised merchandise, but supplements this with consistent local advertising. Mr. R. W. Farr, manager of the company, says that he is sometimes accused of advertising too extensively. He is of the opinion, however, that he simply spends money in this way that very many electrical dealers lose by allowing a great deal of waste, odd and broken lines to accumulate, or by letting had debts creep into their books. Mr. Farr is very careful to keep their accounts up to date and ever watchful that no dead stock gets hidden away on the back shelves.



Popular Priced Electricians, Hamilton, Ont.—Good windows, well dressed

The city of Hamilton is well supplied with electrical stores, which competition, doubtless, accounts for the attractive appearance of many of them. They do not find, however, that there is not business enough for all. The experience, on the contrary, is that the more they specialize and the better they organize for merchandising, the more business there is for everybody.

This company also carry on a general contracting business, but, as the photographs indicate, they do not neglect the retail end of the trade, which they find extremely remunerative.



Illumination of Osgood Hall, Toronto, in honor of Prince of Wales' visit

Illumination During Visit of Prince of Wales

The above photo of Osgood Hall was taken at twelve o'clock at night with no other source of light than that used for decorations. On account of the trees being so close to the building is was necessary in order to get a picture of the entire building to take two distinct pictures.

James Devonshire, Limited, who received the contract for lighting, were successful in persuading the authorities to change their idea from outlining the building with small lamps to a system of flood lighting, pointing out that it would be impossible to show up the splendid architectural features with a system of outline lighting. On explaining the system of flood lighting permission was given to go ahead but with the following instructions:

To erect no poles on the grounds, have no obstructions, and not to cut a single branch of the trees.

As the foliage on the trees is particularly heavy it was quite difficult to place reflectors to any advantage. After some juggling and tying of branches it was possible to mount the reflectors in such a way as to place the rays on the building in a fairly even beam, and by removing the lamps on the Hydro pillars immediately in front of building and placing reflectors in their place sufficient light was obtained to cut the biggest part of the shadows caused by foliage of trees. In all, six flood lights were installed in trees and four reflectors on pillars.

Exclusive Right Belonged to Owner of Apartment House

John Quinlan's freedom to make a contract with the city of Westmount and to grant to the city exclusive right to supply electric current to the tenants of his apartment house on St. Catherine street, Westmount, notwithstanding any privilege the Montreal Light, Heat and Power Company might claim to have to supply electric light to the said tenants, was upheld in a judgment Mr. Justice Greenshields handed down in the Superior Court yesterday. The action was dismissed in which the Montreal Light, Heat and Power Company sued Mr. Quinlan and the city of Westmount for $1,000 to compensate the company for loss of profits on contracts they had with the Quinlan tenants.

Some years ago Mr. Quinlan entered into a contract with the plaintiff company for the lighting of the halls and corridors of his apartment house at Westmount. When this contract expired it was not renewed, but a contract was made with the city of Westmount to supply the light.

There is only one main service wire entering the building. This belongs to Mr. Quinlan and as, under the new contract, the wire was handed over to the Westmount lighting authorities, the Montreal Light, Heat and Power Company found itself cut off from means to supply electric current to the tenants of the apartment house with whom the company had entered into contracts which extended beyond the limit of the contract with Mr. Quinlan. It was for damages through being deprived of means of service into the apartment building that the present action was taken.

"The apartment building," Mr. Justice Greenshields said in his judgment, "was equipped with only one main service wire, which was the property of Mr. Quinlan, and by means of which alone could electric current be supplied for lighting purposes to the halls, corridors and janitor's apartments and any and all other apartments in the house. On the 10th of October, 1916, the plaintiff's exclusive right to furnish electric current to the tenants of John Quinlan has ceased and terminated, and Mr. Quinlan was at liberty to grant such exclusive right to any person or company. In making a contract with the city of Westmount and granting to it the exclusive right to supply electric current to his tenants, John Quinlan violated no obligation due by him to the Montreal Light, Heat and Power Co. and was within his rights in instructing the city of Westmount to connect its supply wire with Quinlan's main service wire in the apartment building. The plaintiff's action and demand is unfounded in fact and in law."

The action as directed against Mr. Quinlan and the city of Westmount was therefore dismissed, with costs.

New Book

The Electrical Trades Directory and Handbook—published by "The Electrician," 8 Bouverie Street, London, E. C. 4, England; thirty-seventh edition; 1,330 pages; bound in blue cloth; price 15 shillings net. This, as the name implies, is a directory of the electrical engineering and allied trades. The new 1919 edition contains about 80 pages more than the 1918 issue, mainly due to an increase in the number of the entries in the alphabetical and classified trades sections of the British and Colonial divisions. Considerable improvements have been effected in the arrangement of the contents; the thumb holes and tabs facilitating reference. Five hundred pages in the book are given over to a large quantity of useful information.

When you've wired a man's house or factory you've simply scratched the surface of the possibilities for doing business with this client.

How to Get Profitable Industrial Lighting Business

PERHAPS many dealers will doubt the statement that less than half the industrial plants of the country are adequately lighted. Certainly the majority of plant owners will tell you on your first visit that their plant most decidedly is properly lighted. Perhaps it is, but statistics show that there is an even chance that it is not lighted in the most efficient manner possible.

When making up your mind whether you will or will not undertake an industrial lighting drive, do not assume that the plants in your vicinity are correctly illuminated. Go out and find out.

Not many years ago a salesman was selling illumination in Cleveland. Now, Cleveland has long been considered by many as a fountain head of illuminating knowledge. It, therefore, would seem logical that the standard of factory illumination of Cleveland should be exceptionally high. Perhaps it was high as compared with other towns but there was a woeful lack of properly lighted industrial plants. Not to mention any names, it might be stated that some of the plants with the poorest illumination "should have known better." Perhaps it was another case of the poorly shod shoemaker's children.

This is mentioned simply to prove that you can't go very far on supposition. You are going to be startled when you find the classes of industries which are still using only half-way good illumination.

What are the definite benefits which you will get from a hard drive after industrial lighting business? Here are some of them:

First: If a contractor, you will profit by the actual work of installing a better system.

Second: Whether contractor or dealer, or if both, you will profit by the sale of the lamps, shades and fixtures installed.

Third: There will be future profit in re-orders for lamps. It is your installation and, if properly handled, you will get the future lamp business from it.

Fourth: Every good installation means a satisfied customer—which brings you added business:

(a) More lighting business from this and other plants.

(b) Sales of other electrical appliances, motors, wiring supplies, etc.

Every good installation to your credit keeps talking and selling for you through future years.

Know the Facts.

No really profitable business can be had without making a sincere effort. Your first effort in seeking industrial lighting business must be to instruct yourself and your salesmen (if you have salesmen) in the principle of proper industrial illumination. This is not difficult. You do not have to "go to school" or sit up through long evenings and pour over text books. All of the facts which you will need to know can be obtained from publications issued by your lamp company. These facts are few and simple. You ought to know them as a competent member of the electrical fraternity.

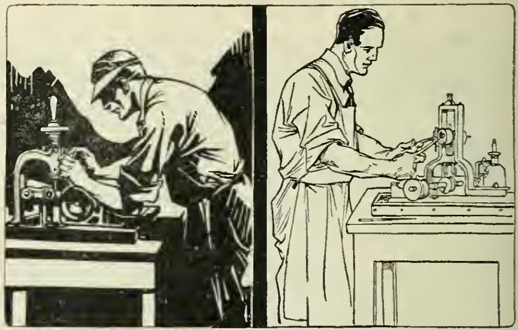
If your organization is such that you employ salesmen, it is a part of their job to know the principles of proper illumination. See that they do know these principles and apply them. They will profit—you will profit.

Before going out yourself or sending out your salesmen you should plan to eliminate all unnecessary calls, all waste effort. Make sure that your list of prospects is 100 per cent. perfect. You will probably be able to make a fair-sized list out of your own head. Add to this names supplied by your outside men, salesmen, wiremen, or any of your employees. Study this list carefully. See that it contains the names of the correct men in each case to be seen. You can well afford to spend a week or two in perfecting this list before you make any further effort to sell illumination. Send your salesmen out to get the facts first hand. Some good lists have been made by writing to the firms stating frankly what you want and enclosing a stamped return card for them to use in giving you the name of the correct party.

Much of your time and of your salesmen's time will be saved by the proper use of advertising. Newspapers, circular letters, folders—all are good. Probably for this sort of a campaign, however, advertising through the mails will give you better results. An excellent plan is to start your campaign with some newspaper advertising, following it up with convincing letters, folders and mailing cards. Your lamp company will gladly supply you with this material.

Don't Be Too Easily Discouraged.

Do not expect to get a very great percentage of direct inquiries as a result of this newspaper and mail advertising. Many contractor-dealers have become discouraged because they sent out a number of letters with return cards and received practically none of the cards back. This does not necessarily mean that the letters have not been read. Follow up your letters and mailing cards with personal calls and you will find that the prospect has been prepared, has been partially sold perhaps. In any event, the path of the salesmen will be made easier.



Note the contrast—your factory may have plenty of light but be poorly illuminated

Do not make the mistake of aiming your shots too low. Don't try to sell the shop's foreman when he really has no authority to make any changes in the equipment of the plant. It is often easier to approach the president of a corporation than the lesser lights. However, you should not overlook the shop foreman entirely. A little tact will soon show who is the right man to approach. In some cases the president or general manager leaves questions of illumination to their subordinates, but even so, the president or general manager is vitally concerned with the output of the business. You are selling something which will increase that output. You are selling something which will reduce the cost of production, reduce the amount of spoilage of material. Go to him with confidence that you can do these things and you will get a hearing.

A large number of your prospective customers will be skeptical. They will say "My lighting is good; I cannot see how you can improve it. I am not getting any complaints from my workmen and as far as I can see there is not an undue amount of defective material; nor are there more accidents than must be expected." Here's where you must show him. Use figures to back up your arguments.

Show Prospect the Facts.

Use an instrument like the foot-candle meter, for instance, which will show truthfully the actual amount of illumination which that factory is getting. The foot-candle meter will show the factory executive just exactly how much light he is getting in every part of his plant. It is a direct reading instrument which indicates the actual number of foot candles. With it you can show the contrast between the good illumination over a bench, perhaps, and the poorer lighting near an important machine; you can show the great falling off in useful illumination through shadows caused by the workmen and their machines. Your illumination tables will indicate the correct amount of lighting considered necessary for each class of work. The foot-candle meter will show what illumination is actually present.

If you are going after the industrial lighting business to any extent, you will find this instrument most helpful and a profitable investment. Ask your lamp companies about it.

But the foot-candle meter is not indispensable to the success of a campaign for industrial lighting business. The chief essentials are:

1. A knowledge of the principles involved—which you can easily acquire.
2. A carefully selected list of prospects.
3. A planned campaign of preliminary advertising.
4. A close and persistent follow-up with personal selling.
5. The right material correctly installed.
6. Faith in your ability to better your prospect's lighting system and the stick-to-it-iveness to make him believe in you.

Don't expect results too quickly. Keep at it. When you find a plant which you know is poorly lighted do not give up until you have landed the business.

Progress in Electric Lighting

At the last annual convention of the National Electric Light Association a number of interesting committee reports were presented. The reports not only refer to the technical points involved in installing lighting systems, but to the stimulation necessary to make the average business agent successful in placing new orders for wiring and equipment. Briefly the reports as summarized in the "Electrical World" follow:

Stimulation of Lighting Business.

Store lighting is of special importance at the present time since it is in this field of lighting that increased business can be secured quickly and easily For this reason campaigns of an educational nature, supplemented by local effort, should be conducted in the trade and the popular press to emphasize the relation between good lighting and sales.

From the lighting point of view stores can be divided into three classes—(1) the large department and drygoods stores, which can usually afford to engage consulting illuminating engineers; (2) the distinctive shop in which individuality is the keynote (these should not be handled by the campaign method since it is the suggestion of artistic or novel methods of lighting which appeal to them most), and (3) small stores, which, though of little importance individually, are of great importance collectively and are best adapted to campaign treatment.

In a campaign directed at the latter the first step is to adopt one or two fixtures which can be obtained and stocked easily, to reduce the selling expense. Then a meeting should be called with local contractors to outline the campaign and decide on the price of wiring per outlet, terms of payment, method of financing, etc. This step can be followed by local advertising news stories on the value of good lighting, lantern-slide lectures before local merchant associations, mailing booklets to prospective customers, etc.

Street and Residence Lighting.

A plan for inviting all central stations to install a block of model street lighting was presented by the committee on lighting of streets and highways. The aim was that there might be a conspicuous demonstration of modern lighting efficiency in every city. The need for better lighting on interurban highways for the encouragement of motor traffic was urged, and the development of farm load and factory sign load along these highways to help finance the extensions was recommended.

The average gross revenue from residence consumers continued on about an average basis during the past two years, according to the sub-committee on residence lighting. Active selling of electric merchandise and the elimination of empty sockets are the principal methods of keeping up this revenue.

The average cost of securing old house-wiring contracts, including the expense of carrying the account, was approximately $5 per contract in 1916 and 1917. Under the stress of financial conditions it was deemed advisable by one company to make this soliciting cost a part of the contract price. By this plan the company in question expects to save approximately $20,000 during 1919.

The possibility of applying outdoor illumination to night work or recreation, monumental structures, pageants and festivals, flags and displays, is once more open. This load is not only desirable as a revenue producer, but as a means of focusing attention on the subject of lighting and keeping it alive in the minds of the people. The extension of outdoor lighting will, no doubt, stimulate higher standards of intensity in commercial lighting installations.

Industrial Lighting.

A marked interest was shown in the address given by William A. Durgin on "Our Manufacturing By-product" during which he demonstrated the proper method for illuminating industrial plants. Mr. Durgin showed how correct lighting has affected production in a number of industrial plants where he has conducted tests. His tests were carried on at much higher illumination values than those proposed by the I. E. S. and showed that with a 5 per cent. increased investment in lighting the plant production could be increased from 15 to 27 per cent.

Central Station Activities.

To help develop new lighting business, to improve existing lighting and to promote the satisfaction of present customers by giving them more effective lighting are the three commercial purposes of illuminating engineering in the central-station industry, according to the sub-committee on lighting of public buildings. To help achieve these purpose the Commonwealth Edison Company of Chicago has just prepared a list of architects, builders and contractors to whom will be sent the schedule of rates of the company and information sheets on Edison service, information on modern methods of interior wiring, interior and exterior lighting, electric motor drive, etc.

For a similar purpose the Philadelphia Electric Company prepared a very attractive illustrated booklet on church lighting.

Lamp Equipment.

Very few departures have been made during the last two years in the design of equipment to provide better and simpler means of controlling and redirecting light, according to the committee on commercial aspects of lamp equipment. The big problem has been to furnish the proper equipment for gas-filled lamps.

As a means of helping the introduction of good lighting central-station men should foster the movement to introduce electrically equipped furniture. Many houses and apartments were wired before the day of portable lamps, and in such places the wired furniture often fills a long-felt want.

Program for 1919 Convention of Illuminating Engineering Society

It is the plan of the papers committee of the Illuminating Engineering Society to have each session of the convention at Chicago Oct. 21, 22, 23 and 24, so arranged that all topics discussed at the session will have a bearing on some single phase of the lighting industry. Tuesday afternoon's session will be devoted entirely to opening addresses and reports of committees; Wednesday morning's session to street lighting, searchlighting and photometry; Thursday morning's session to glare, the industrial code symposium; Thursday afternoon's session to papers of interest to commercial men, and Friday morning's session to papers on the design of interior illumination. Visits to the Chicago Electrical Electrical Trade Exposition and other entertainment features will occupy the time which it is indicated will not be taken up by convention sessions.

The program as arranged by George H. Stickney, Harrison, N. J., chairman of the papers committee, is as follows: "Presidential Address," Doctor George A. Hoadley, Swarthmore, Pa.; "Report of Committee on Automobile Headlight Specifications," Doctor C. H. Sharp, chairman, Electrical Testing Laboratories, New York City; "Report of Committee on Lighting Progress," F. E. Cady, chairman, National Lamp Works, Cleveland, Ohio; "Street Lighting With Low Mounted Units, Kensico Dam Drive," J. Howard Williams, former engineer New York Department of Water Supply, New York City, and C. A. B. Halvorson, engineer, General Electric Company, West Lynn, Mass.; "Recent Developments in Gas Street Lighting," F. V. Westermaier, engineer, Welsbach Street Lighting Company, Philadelphia, Pa.; "Searchlights in the War," Captain Chester Lichtenberg, office of the chief of engineers, War Department, Washington, D. C.; "A Universal Photometric Integrator," F. A. Bendford, illuminating engineering laboratory, General Electric Company, Schenectady, N. Y.; "Photo-Electric Photometry," Doctor A. H. Compton, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; "Glare," Ward Harrison, illuminating engineer, National Lamp Works, Cleveland, Ohio.

"Symposium of Industrial Lighting Codes:"

(a) Introduction by L. B. Marks, consulting engineer, New York City.

(b) The code in Wisconsin, by J. A. Hoeveler, electrical engineer, Wisconsin Industrial Commission, Madison, Wis.

(c) The code in New York, by J. H. Vogt, director of industrial hygiene, State Industrial Commission, New York City.

(d) The code in New Jersey, R. H. Leveridge, chief of the bureau of electrical and mechanical equipment, Department of Labor, Trenton, N. J.

(e) The code in Pennsylvania, by a representative of the Department of Labor, Harrisburg, Pa.

(f) Insurance inspectors and the code, by R. E. Simpson, engineer, Travelers Insurance Indemnity Co., Hartford, Conn. "Opportunities for Extending Lighting Through New Applications," by R. M. Searle, vice-president, Rochester Railway & Light Company, Rochester, N. Y.; "Factory Lighting a Central Station Problem," by O. R. Hogue, head lighting agent and J. J. Kirk, illuminating engineer, Commonwealth Edison Company, Chicago; "A Survey of Industrial Lighting in Fifteen States," By R. O. Eastman of Fuller & Smith, Cleveland, Ohio; "Indirect Lighting of Rooms," by J. L. Stair, illuminating engineer, National X-Ray Reflector Company, Chicago, "Principles of Interior Illumination," by Bassett Jones, consulting engineer, New York City; "Co-Efficients of Lighting Utilization," by Ward Harrison and E. A. Anderson, Cleveland, Ohio; "Tests of Lighting Units," by VanRensselaer Lansingh, engineer, Cincinnati, Ohio.

The American Electrical Heater Company have issued an attractive bulletin, No. 5, illustrating and describing the American Beauty household equipment.

The Quebec Railway, Light, Heat & Power Company have asked the council to amend the contract with the company so that the tramway fare will be 7c straight within city limits, with 2c for a transfer ticket. Workingmen's tickets, it is requested, should be sold at the rate of 11 for 50c.

Guts

The title of my verse, I fear,
May jar upon the cultured ear
And shock the squeamish and precise,
Whose speech is always over-nice;
But yet the simple truth remains
That, whether men have brawn or brains,
The thing that lifts them from their ruts
Is guts.

With purpose firm as adamant
It meets the coward's whine, "I can't,"
And in a voice emphatical
Declares the doctrine of "I shall!"
It turns the idler's "It may be"
To roseate reality,
And laughs with scorn at "ifs" and "buts,"
Does guts.

It picks the fighter from the dust
In which he falls, and cries "You must!"
Til, heartened and aroused anew,
He struggles up and battles through.
It rips the planking from the floor
And bursts the oaken prison door
That Fate or Fortune coldly shuts—
That's guts!

Rufus T. Strohm in "Trumbull Cheer."

Lighting Efficiency Foremost in Design of New Plant at Montreal

OF the many interestiing features of design and construction embodied in the new building of Messrs. Crane Limited, at Cote St. Paul, Montreal, features which combine to make this plant one of the most up-to-date of its kind in the Dominion, the most conspicuous is illumination.

It may be of interest to note that this plant is to be the main Canadian branch of the Chicago firm of Messrs. Crane Limited, manufacturers of plumbing and steam-fitting supplies. The first floor is set apart for storage and shipping space, with adequate provision for office accommodation, while the second and third floors are given over to the manufacturing departments of the Company's business.

The building, the dimensions of which are 280 ft. x 140 ft., is three storeys high, U-shaped in design, so planned as to afford the maximum amount of light throughout the whole premises, regardless of the location of operations on the various floors. The walls throughout are whitewashed, as a solution to the problem of diffused light and so as to provide natural reflection both for day and night operations. The building of the mushroom type, steel and concrete construction, with columns placed 20 feet on centres, there being three sash mullen windows, with four mullens to each bay.

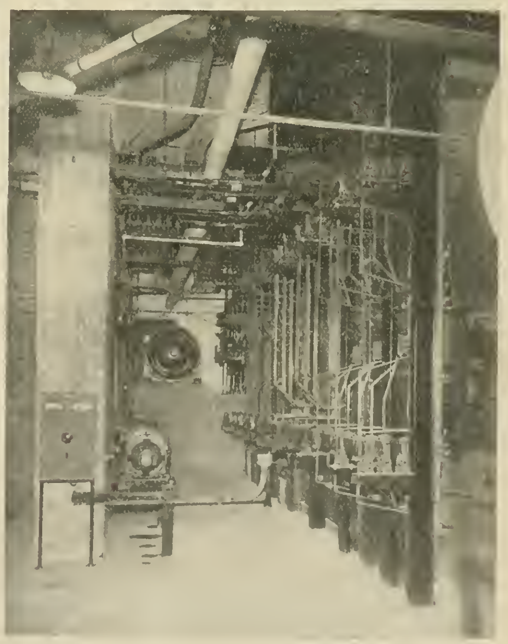
An underground service of 11,000 volts enters the basement of the building through day ducts. After going through the necessary high tension equipment and being transformed with a ratio of 50 to 1, it is carried over ¼ in. by 5 in. copper bus, which in turn runs to a main switchboard, located in the engine room 60 ft. away.

The switchboard, photographs of which are reproduced herewith, is of the latest type, it being 24 ft. long and 14 ft. high and having 70 circuit-breakers. It has in incoming main circuit-breaker and a 3-pole single-throw knife switch through the necessary meters, comprising ammeters, voltmeters, indicating watt meter, and polyphase watt-hour meter. There are 21 overload circuit-breakers (No. 983 G1-19, type C, form G. Canadian General Electric Company), with a calibration of 60-150 amperes. The power section of the switchboard has a similar arrangement, with rows of breakers seven side and seven high.

Arrangement of feeder distributing conduits

A large pull-box is located at the top of the switchboard,

Special lighting, centre of distribution, and motor starting compensator



Rear view of switchboard, Crane, Ltd., Montreal with a wiring trough running down back of the board between each set of breakers. This trough conceals the feeders to the different localities within 12 in. of the breakers. Each lighting panel is controlled by individual breakers, regardless of its location in the building, some of the panels being 360 ft. distant from the switchboard. Should any breaker blow out, a bell-ring attachment and red light over each riser of seven breakers convey to the operator the source of the trouble.

The lighting cabinets are also a point of interest. A wiring space at the back of the slate panels eliminates any possibility of interruption in the service, as circuits may be removed or added at any time, there being a door on each side of the cabinet opening to the wiring space.

View of switchboard, Crane, Ltd., Montreal

The lighting, which is standard throughout the building, is done by a 300-watt No. 5644 Benjamin dome reflector, with mogul socket. Each light is so located that its illumination covers 400 square feet, or 1-1/3 watts a square foot. The ceiling is 14 ft. high and shadows are entirely eliminated, the aim being that the operations of the firm shall be carried on with equal despatch under varying and adverse conditions of outside light.

The installation was made by the Canadian Comstock Company, Limited, according to designs prepared by Messrs. H. S. Stewart and G. F. Reuflin of the Crane Company.

Every job you complete to the satisfaction of your client remains a permanent advertisement for you for many years to come.

At the hearing of the appeals on September 23 it was decided that the city of Montreal should engage Mr. B. J. Arnold, of Chicago, to make an immediate report on the operating and maintenance expenses of the company. The cost is to be borne by the city. A request that the appeals be postponed pending Mr. Arnold's report was refused, the Utilities Commission deciding to proceed with its investigation.

The Laurentide Co., Ltd., Grand'Mere, P.Q., will install three additional grinder units each consisting of a 2800 h.p. motor, direct connected to two grinders. This will increase the capacity of the groundwood department to 400 tons of ground wood per day.

Illumination of a New School at Lennoxville, Que.

To maintain the high standard sought after in the new Lennoxville school, careful consideration was given to all details of both the artificial and natural illumination to create the best working conditions possible for the students. As a guide to the obtaining of the best results, the requirements laid down in the "Code of Lighting for Schools" of the Illuminating Engineering Society of New York were used.

Intensity of Illumination.

In general the following desirable intensities of illumination, as called for in the "Code of Lighting for Schools," were used throughout:

Locality.	Artificial Lighting Foot-Candles.	
Storage spaces	0.5	1.0
Stairways, corridors	1.0	2.5
Gymnasiums	2.0	5.0
Rough shop work	2.0	4.0
Auditoriums, assembly rooms	2.5	4.0
Class rooms, study rooms, libraries, laboratories, blackboards	3.5	6.0
Fine shop work	4.0	8.0
Drafting rooms	6.0	12.0

Main Assembly Hall, Lennoxville School, Lennoxville, Que.

Daylight requirements were figured at least double the above figures for artificial illumination.

Class Rooms.

In all cases the desks were so arranged that the daylight would come from the left side, when the room had windows on one side only, and from the left and back, when the room had windows on two sides. Window area was figured at least 25 per cent. of the floor area and the ratio of window height to room width not less than one to two.

The artificial lighting is of the semi-indirect type using dense glass bowls fourteen inches in diameter with one 75-watt nitrogen-filled lamp. The fixtures are so spaced as to give a minimum illumination of 4 foot-candles on the desk space tops.

The dense bowls were chosen to eliminate glare and also reflections of the image of the lighted bowl from desk tops, papers or any other reflecting surfaces.

Blackboards are mounted with the tops tilted back which very materially reduces direct reflections of bright areas and therefore writing on them can be read from any position in the room.

The painting and decoration of the class rooms was kept in a light tone and of a matt finish to avoid absorption of light.

Dormitories and the infirmary are lit with identical fixtures to the class rooms the intensity of illumination, however, being lower.

Stair case halls, corridors, lavatories and play rooms are illuminated by means of direct lighting, the fixtures being equipped with dome-shaped Moonstone glass reflectors of a sanitary type to permit of easy cleaning.

Dining Room.

For the artificial lighting of the dining room, a system of direct lighting was adopted on account of the better efficiency and its more pleasing result in producing high lights on the table ware and illuminating the tables to a higher degree than the surrounding walls and the ceiling. The average illumination on the dining tables is 3 foot-candles.

Kitchens.

The fixtures in the kitchens are of the direct lighting type, mounted on the ceiling, equipped with a sanitary type Moonstone reflector. The average illumination is 3 foot-candles.

Assembly Hall.

The main assembly hall has a stage with dressing rooms off, providing for the staging of plays and entertainments. At the back of the hall there is a gallery. The lighting scheme must, therefore, be capable of producing different intensities and light sources must be kept out of view from both the main floor and gallery. The scheme adopted was of the semi-direct type with main central fixtures and wall brackets. The maximum average illumination is 3 foot-candles and the fixtures are so circulated that this may be reduced down to a low intensity when the occasion requires it.

The architect for the school was Mr. Kenneth G. Rea, F.R.I.B.A., and Geo. K. McDougall, the consulting electrical engineer. The Jefferson Glass Co., Limited, supplied the glassware.

Fifty Safety Cars on Lines of the Virginia Railway & Power Company

Twenty "Safety" cars are now in operation in Petersburg, Va., twelve in Norfolk, Va., and eighteen in Richmond, Va. In Norfolk, the cars operate on the Atlantic City-East Main and Brambleton Line, which passes through the very narrow congested streets of Norfolk, including Granby Street, the principal thoroughfare. Formerly this line was operated with seven cars on a ten-minute headway. Now a seven-minute service with ten cars is given. Car mileage has been increased 38 per cent. and the number of revenue passengers has increased approximately 20 per cent.

In Petersburg, Va., the cars are used to replace old single-truck longitudinal-seat cars, with a seating capacity of 24 passengers. With the decreasing soldier traffic from Camp Lee, the density of travel did not warrant an increase in service, so that a car for car replacement was made. The new cars are so convenient and comfortable, however, that a slight increase in travel has resulted.

In Richmond, Va., the cars are operated on the Belmont Avenue and the Laurel Street lines, both of which make the Eighth Street-Main Street-Ninth Street-Broad Street loop which handles the most congested travel in Richmond. Service has been increased on the Belmont Street line approximately 55 per cent., and on the Laurel Avenue line approximately 40 per cent.

On Wednesday, August 6, a test trip was made by the Mayor of Richmond, accompanied by city officials, to investigate whether or not the operation of a street car by one man was hazardous. The car was put through various "stunts" on the level and on some of the 7 per cent. and 8 per cent. grades, and the entire investigating committee, including the Director of Public Safety, were enthusiastic over the car and were convinced that the safety features were designed for every emergency. Director of Public Safety Myers declared that the one-man street car used in Richmond is a "thoroughly safe car" and that the modern appliances with which it is equipped "make it the safest of any car operated by the Virginia Railway & Power Company in the city.

The maximum permissible load in the "Safety" car is placed at fifty passengers, and when the car has this number of passengers aboard, a "Car Full" sign is shown. This is a welcome innovation for the people in the car, and, since very frequent service is given, passengers who are passed up do not complain.

In laying out the Richmond schedules, two methods were used. On the Belmont line runs were laid out so that each operator had a straight run of approximately nine hours without a swing run. On the Laurel Street line, ten-hour and eight-hour runs provided with a two-hour swing for the eight-hour run. The men preferred the latter arrangement for it permitted them to make more money.

In order to decrease the work of the operator as much as possible, the matter of reports is cut down to a minimum. Non-recording fare boxes are used so that the only reports made at the end of a day's run is the time on and off and the register reading upon taking the car and leaving it. The elaborate trip reports have been entirely discarded. A simple form of safety car transfer has been designed which will permit the operator to punch the time before starting from the end of the line and will necessitate only one more punch at the time of issuing the transfer.

The cars are of the standard Birney type, manufactured by the American Car Company, of St. Louis, Mo., are arranged for double-end operation, and a large number are equipped with Westinghouse sleeve-bearing No. 508 motors, type K control, and Westinghouse air brakes.

In preparing the public for this type of service, an educational campaign has been conducted for the past ten months, starting before the cars were even purchased. Full descriptions of the cars, places where they are used, advantages to the public, and other details, have been given in an interesting and instructive manner. This campaign was carried on through the bi-monthly company publication, "Public Service News."

The Sissiboo Pulp & Power Co., Weymouth, N.S., are remodelling their mill, with a view to adding to their output. The electrical power is to be increased, and the S. Morgan Smith Co., of York, Pa., has been awarded the contract for reconstructing the turbines.

Approximate Intensities of Illumination Demanded by the Different Classes of Industry

Industry or class of Service	Intensity in Foot Candles	Watts per Sq. Ft. Small Room	Watts per Sq. Ft. Large Room
Armories	2. to 3.	0.52	0.35
Auditoriums	2. to 3.	0.52	0.35
Automobile Garages	2. to 3.	0.52	0.35
Bakeries	3. to 4.5	0.78	0.5
Billboards	6. to 8.	...	...
Billiard and Pool Rooms			
General	1.5 to 2.	0.45	0.3
Tables	4.5 to 6.	1.45	0.85
Bookbinding			
General assembling and binding operations	2.5 to 4.	0.6	0.4
Finer operations, as cutting and punching	3.5 to 5.	1.0	0.6
Embossing	5. to 8.	1.7	0.92
Bowling Alleys			
Alleys, runways, seats	1.5 to 2.	0.45	0.3
Pins	3.5 to 5.	1.0	0.6
Box Making; in Wood or Paper.	2.5 to 4.	0.6	0.4
Candy Making	3. to 4.5	0.78	0.5
Clothing, Cloaks, Suits, Caps, Making of			
Cutting, hand sewing, pressing.	5. to 8.	1.7	0.92
Machine sewing, inspecting	8. to 12.	2.4	1.45
Packing, shipping	3.5 to 5.	1.0	0.6
Collar, Shirt and Light Color, Cloth Products			
Machine sewing, inspecting	5. to 8.	1.7	0.92
Cutting, laundering, pressing	3.5 to 5.	1.0	0.6
Corridors, Stairways, Elevators, Passages	0.5 to 2.	0.35	0.25
Cotton Mills			
Carding, lapping, spinning, slashing, warping, packing	2.5 to 4.	0.6	0.4
Drawing in, dyeing, weaving	3.5 to 5.	1.0	0.6
Inspecting	8. to 12.	2.4	1.45
Courts; Handball, Tennis	7. to 9.	2.2	1.3
Depots			
Train sheds, baggage rooms	1.5 to 2.	0.45	0.3
Waiting Rooms	2. to 3.	0.52	0.35
Drafting Rooms			
Drawing Tables	8. to 12.	2.4	1.45
Records—general work	3.5 to 5.	1.0	0.6
Electrotyping and Electroplating	3.5 to 5.	1.0	0.6
Engraving			
Engraving, stippling	8. to 12.	2.4	1.45
Transferring, polishing	4. to 6.	1.4	0.8
Factories—General			
Rough operations, as forge, lumber, tannery	2. to 4.	0.6	0.4
Medium operations, as automatic machines, rough bench work	.3 to 5.	1.0	0.6
Fine operations, as glove, hat, button making, fine lathe or bench work	4. to 8.	1.65	0.9
Extra fine operations, as jewelry work, typesetting, work on dark textiles	7. and up	2.4	1.45
Knitting Mills			
Finishing, knitting, looping, seaming	3.5 to 5.	1.0	0.6
Napping, packing, shipping	3. to 4.5	1.4	0.8
Laundries	3.5 to 5.	1.0	0.6
Leather working and manufacturing			
Cutting, sewing, matching	4. to 6.	1.4	0.8
Pressing, inspecting, shipping.	3.5 to 5.	1.0	0.6
General, tanning	2.5 to 4.	0.6	0.4
Machine Shops			
Die making, fine bench work	8. to 12.	2.4	1.45
Assembly, erecting, etc.	5. to 8.	1.7	0.92
Automatics, drills, grinders, planers, lathes, bench work	3.5 to 5.	1.0	0.6
Saws and rough assembly	2.5 to 4.	0.6	0.4
Markets	3.0 to 4.5	0.78	0.5
Meat Packing Plants	2.5 to 4.	0.6	0.4
Office Work, such as typewriting, accounting, etc.	4. to 8.	1.65	0.9
Paint Shops			
Fine work, as furniture, design work, etc.	5. to 8.	1.7	0.92
Medium work, as signs, metal painting and paint manufacturing	3.5 to 5.	1.0	0.6
Pottery Making			
Grinding, loading, kilns, packing	2.5 to 4.	0.6	0.4
Cleaning, coloring, trimming and finer operations	3.5 to 5.	1.0	0.6
Power Houses	2.5 to 4.	0.6	0.4
Printing			
Presses, proofreading, machines, cutting, folding	3.5 to 5.	1.0	0.6
Typesetting	5. to 8.	1.7	0.92
Linotype, monotype	8. to 12.	2.4	1.45
Shoe Manufacturing—Rubber Products			
Bench and machine work, shipping	3.5 to 5.	1.0	0.6
Finer operations as cutting, lasting, sorting	5. to 8.	1.7	0.92
Show Windows or Space			
Low with light, high with dark color goods	10. to 22.	...	...
Silk Mills			
Weaving	5. to 8.	1.7	0.92
Finishing, warping, winding	3.5 to 5.	1.0	0.6
Steel Mills	2. to 4.	0.6	0.4
Streets			
Business (not including light from signs or windows)	0.4 to 0.8	...	...
Country roads	0.05 to 0.15	..	...
Prominent (in residence district)	0.2 to 0.4	...	...
Residence	0.1 to 0.25	..	...
Warehouses	1.5 to 2.	0.45	0.3
Wharfs	1. to 1.5	...	...
Wood Working			
Fine, as carpentering, pattern, furniture making	4. to 6.	1.4	0.8
Rough, as wagon, box, barrel making	2.5 to 4.	0.6	0.4
Woolen Mills			
Inspecting, perching	8. to 12.	2.4	1.45
Weaving	5. to 8.	1.7	0.92
Packing, warping, washing, combing, shipping	3.5 to 5.	1.0	0.6
Carding, dyeing, twisting, receiving	2.5 to 4.	0.6	0.4
Yards and Industrial Roadways	0.15 to 0.6	...	...

Downstream view, left to right:—Sluiceway at forebay entrance, earth embankment for forebay, main dam and sluiceway, on south channel of Madawaska river. Power house, not seen, situated in the immediate foreground, lower left hand corner

Calabogie Hydro-electric Development

Plant Constructed on Madawaska River, near Renfrew, Ont., in Seven Months Under Pressure of War Requirements

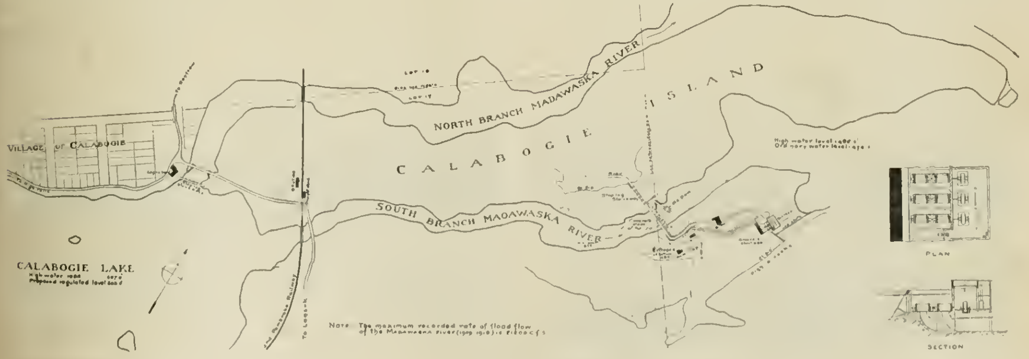
By A. L. Mudge* and A. R. Whitelaw†

Constructed under war conditions and developed primarily for war purposes, the hydro electric development of the Calabogie Light and Power Company on the Madawaska River, near Renfrew, Ont., is a remarkable achievement in that within seven months from the start power was available. The speed of construction was materially accelerated hy the use of equipment already built for another plant but adapted to the requirements of this project with immaterial changes.

The village of Calabogie, Ont., is fourteen miles south of Renfrew on the Kingston and Pembroke branch of the C. P. R. At this point the Madawaska River assumes the proportions of a small lake, at the outlet of which it divides its course into two channels for a distance of approximately one mile. Covering this distance was a series of rapids in both channels, with a total fall of 27 feet from the lake level above. Due to this fall being more concentrated in the south channel, and to the natural topography of the banks offering better opportunity for controlling the river by dams and headworks, it was chosen as the most feasible channel upon which to concentrate the total fall for power purposes.

The general arrangement of the headworks for the control of the river is as follows: At the foot of Lake Calabogie on the north branch of the river, a stop-log sluiceway dam was constructed. This is capable of discharging about half the maximum flood flow of the river, and can be used as a cut off to divert the full flow of the river to the south channel when required. About one-half mile below the foot of the lake on the south channel, a solid masonry dam diverts the flow to the left through waste or flood sluices and to the right through sluices which control the flow into the forebay. The forebay is sound by the natural topography of the ground on the right and a built-up embankment extending from one end of the solid gravity dam to the wheel-pits on the left. The forebay is about 1,000 feet long by 300 feet wide. The entrance sluices are located about midway in its length and the power house and wheelpits at its lower end. This puts the power house within 150 feet of the low level of the main river. The fact that the natural shoreline of the river formed a back bay immediately below the power house site helped considerably in this arrangement and location. This arrangement required only a very short cut for a tailrace channel to the main river, which was more desirable than locating the power house at the main dam and thus having a longer cut in solid rock to gain the tail water level.

The north branch dam is of five sluices, 20 feet wide with the stop log sill at elevation 495.0 and deck at elevation 510. The south branch main dam is of the solid gravity type, having its base at elevation 470.0 and top at 510. The sluices to the left of the main dam are similar to those on the north channel, with the exception that a concrete spillway was



Arrangement of headworks for control of river flow. First dam at Calabogie village diverting north branch. Second dam just above power house diverting south branch through a (third) controlling dam at entrance to forebay added to prevent any undermining effect due to the heavy discharge to the main channel below. The entrance dam to the forebay is also of five sluices, 20 feet wide, but with piers 4 feet in width instead of 6 feet as in the case of the north and south branch sluiceways. The dams are all constructed of concrete masonry. The only reinforcement used was that for anchoring the piers and gravity dam to bed rock. All dams have their foundations on solid rock and no special care was taken with the foundation bed other than the thorough cleaning of the seams between the slab foundations or the rock. This was done by water pressure.

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*Chief electrical engineer, Kerry & Chace, Limited.

†Resident engineer.

The dam on the north branch of the Madawaska river near Calabogie village viewed from upstream

The wheel pits are of the open flume type, each pit being 60 feet long, 23 feet wide and 27 feet in depth, constructed of reinforced concrete. The walls are three feet thick and the whole structure is rendered rigid by heavy tie beams and by the gunnel design of the walls at the bulkhead walls at the top. A heavy application of pitch on wheel-pit side of the bulkhead walls reduced the seepage through to the power house interior considerably and was well worth the expense. Steel trash racks are located immediately in front of the wheel-pit openings and rock area has been provided sufficient to add an additional unit to the plant at a later date. The exciter unit has a separate wheel-pit and stop log control to the right of the main wheel-pits.

A steel gate has been provided to unwater any particular flume on short notice. This gate is hung from and operated by a timber gantry which is of some interest owing to the necessity of constructing it of timber. B. C. fir was used, the main sills, posts and beams being of 12 in. x 12 in. stock. The gate is counter-weighed and the operating mechanism is designed to merely overcome the friction and produce motion by movement of the sprockets over which the chain between the gate and counter-weight travels. The gate weighs approximately 20 tons and a 10 h.p. motor is capable of raising or lowering the gate the total distance in from 5 to 7 minutes. The gantry stands some 40 feet in the air from the deck of the wheel-pits and travels on a track from one wheel-pit opening to the other. Provisions has also been made to assert temporary stoplogs in the openings of the wheel-pits after the steel gate has unwatered the pit. This permits the use of the steel gate in case of forced shut-down of two or more units at the same time.

The turbines are the quadruplex horizontal type, manufactured by the Allis-Chalmers Company of Milwaukee, U.S.A. Each turbine of four runners develops about 2800 h.p. There are two draft tubes per unit, the discharge from the upstream tube being guided to pass the downstream tube on each side by the wedge design of the back of the downstream draft opening. Governors on the main units are the oil pressures type of Allis-Chalmers design. The main bearings of the turbines are lubricated by a non-solidifying grease forced through a piping system from the power house.

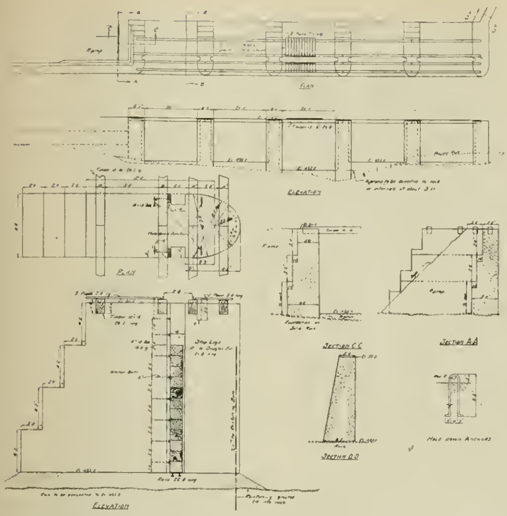
The power house is 70 feet long, 44 feet wide and 40 feet high, constructed entirely of reinforced concrete and brick. There is no outstanding feature in its design, other than the fact that it permits a very compact arrangement of the various equipments and at the same time provides ample room for operation with safety.

Power house, wheel pits and gates under construction

A log chute for passing any timber coming down the river was constructed between the power house and the natural high retaining bank of the forebay. The head lock is of mass concrete while the chute itself is of timber. B. C. fir, 12 in. x 12 in. stock, was used for sills and posts, while the bottom and sides were built up of 2 in. x 6 in. hemlock in laminated style. All of this 2 in. x 6 in. stock was salvaged from the former lumber used during construction. This whole framing is supported by rock-filled crib bolted to bed rock. The chute is 12 feet wide at the top and 5 feet wide at the bottom, with flaring sides, and is built to a curve which

A downstream view of main concrete dam and sluiceway on south channel

Upstream view of south channel works—Main dam on the left, control dam at right, showing entrance to forebay



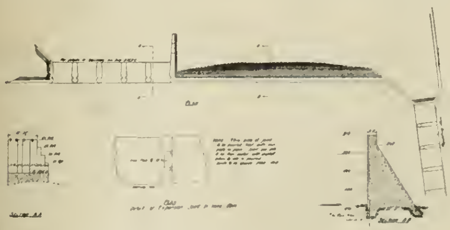
Details of sluiceway dam on north branch of Calabogie river

regulates the velocity in such a way that there is at all points an equal depth of water to float the timber in its course down the chute. This chute has been used a number of times and is highly satisfactory. The chute is also used as a relief for sudden rise in level of the forebay.

Three solid brick houses for the operators have been built on the high land immediately above the power house. These are modern in every respect and are so located that they command an excellent view of the forebay and river above the power house.

In carrying out the construction no heavy equipment was used, other than a couple of derricks and concrete hoists. A railroad siding was built from the station at Calabogie to the power house which facilitated the handling of the heavy permanent equipment. About 18,000 yards of gravel was used and this was of excellent quality for concrete. It was obtained from a pit about three miles from the site of the works. Winter team haul of a large portion of this amount, kept the unit cost per yard within a very reasonable figure. There are no special features of the construction worthy of extensive detail, but the fact that on the first day of May, 1917, not a yard of concrete had been poured for any of the works on the south channel speaks well for the organization management, when the records show the wheels were turning over on November 25th of the same year. It will be remembered that during this period labor was at a premium and delivery of materials very slow so that the construction of this plant was all the more commendable to those in charge.

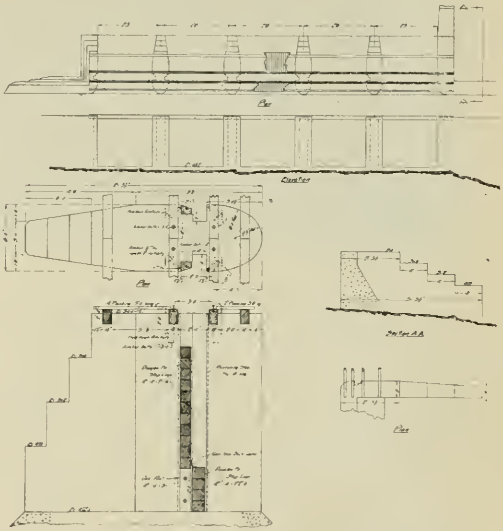
Of the hydraulic, mechanical and electrical machinery entering into the construction of the 6,000 h.p. power house and the 5,000 h.p. Renfrew substation, over 90 per cent. of it was manufactured before the war broke out, although it was not previously in service. This fact meant that a very light demand was made upon our manufacturing resources to obtain the necessary machinery. Incidentally this also meant prompt delivery of equipment. In July, 1917, the engineers promised that power would be delivered in Renfrew by December 1, 1917. On account of the large amount of work left to be done at that time, this statement was received with skepticism in some quarters. However, the wheels were running before the end of November and commercial load was taken over on December 4, 1917, only three days late on an estimate made months before. Since the above date the operating record has been a remarkably good one.



The south channel works—Main sluiceway and dam at left, control dam at right

The following are the particulars of power house equipment:

Two quadruplex horizontal turbines, 3,000 h.p. each under 27 ft. head at 164 r.p.m., each with an oil pressure governor. Each turbine drives through a flexible coupling a 2,000 kv.a., 60 cycle, 3 phase, 6,600 volt generator.



Details of stop-log sluiceway on south channel

One single-runner horizontal turbine 215 h.p. at 350 r.p.m., is controlled by a mechanical governor and drives a 120 kw. 125 volt, compound-wound exciter.

Another exciter generator of the same rating is arranged so that it may be belted to either of the main generators in case of failure of the turbine driven exciter due to ice troubles or otherwise.

All of the above equipment, viz., turbines, governors, generators and exciters were manufactured by the Allis-Chalmers Company of Milwaukee for another customer. However, they were suitable for the hydraulic conditions at Calabogie and were utilized with practically no changes.

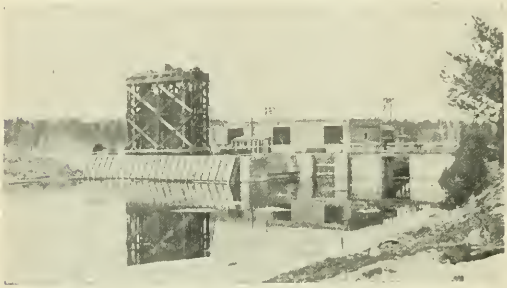
The remainder of power house electrical equipment is as follows:

Three 2,000 kv.a. single phase, 60 cycle, oil-filled water-cooled transformers, stepping up from 6,600 volts to 33,000 volts.

Generator, exciter, transformer, and line panels, Tirrill regulator, lead covered cables, electrically operated remote control oil circuit breakers, H. T. wiring, disconnecting switches, electrolytic lighting arresters, choke coils, etc.

This electrical equipment was all furnished by the Westinghouse Electric & Mfg. Company, who had built it originally to the order of another customer. It had, however, never left the factory until shipped to Calabogie.

The step-up transformers and H. T. switching equipment were designed for 66,000 volts and some slight changes were necessary to adapt them for use at 33,000 volts. This was easily and simply done and resulted in securing double the usual factor of safety upon all the high tension equipment.



Racks and gantry operating gates. Log chute at the right

Besides the above the Moloney Electric Company of Canada furnished three 125 kv.a., oil filled, self-cooled transformers, 6600 to 110/220 volts for power house lighting and heating and supply of power for motors on the auxiliaries.

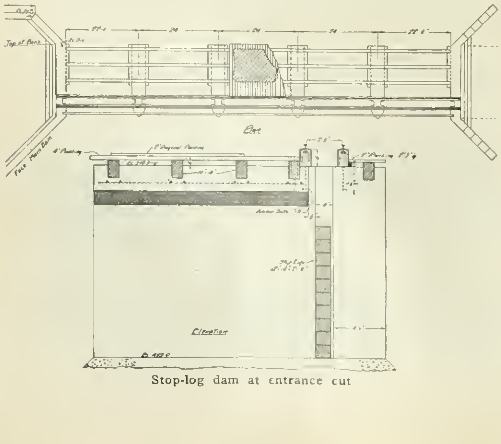
A small Ingersoll-Rand compressor was installed for cleaning purposes.

Transmission Lines

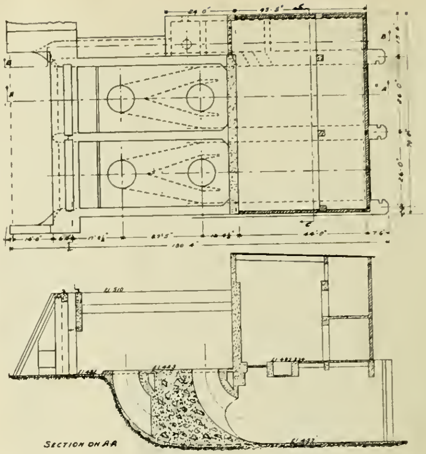
The main transmission line is a 33,000 volt, 3 phase line, 14 miles to Renfrew. There are three No. 4 B. & S. hard drawn, bare copper conductors; a telephone circuit of No. 9 B.W.G. galvanized iron and one overhead grounded wire for lightning protection, consisting of one 7-strand galvanized 9/32" cable. An interesting point in connection with this cable is the very simple and inexpensive means used for its support. On all straight runs it is tied to two 3/8" x 5" lag screws driven into the top of the pole. At all corner poles the cable is brought around the outside of the pole and secured by means of an I-bolt Keystone clamp bolted to pole by means of one 5/8" x 5" lag screw.

The high tension line insulators are Canadian Porcelain Company's 2-piece No. 889, and stood a dry flash-over test of 120,000 volts and a test when wet of 100,000 volts.

A 700-foot span at the crossing of Norway Lake was taken care of by double A-frame structures at each end of the span and both H. T. conductors, consisting of stranded copper clad and telephone conductors of 9/32" steel strand, are supported on strain insulators. Overhead grounded wire was not carried across this span.



Stop-log dam at entrance cut



Plan and section of wheel pits and draft tubes

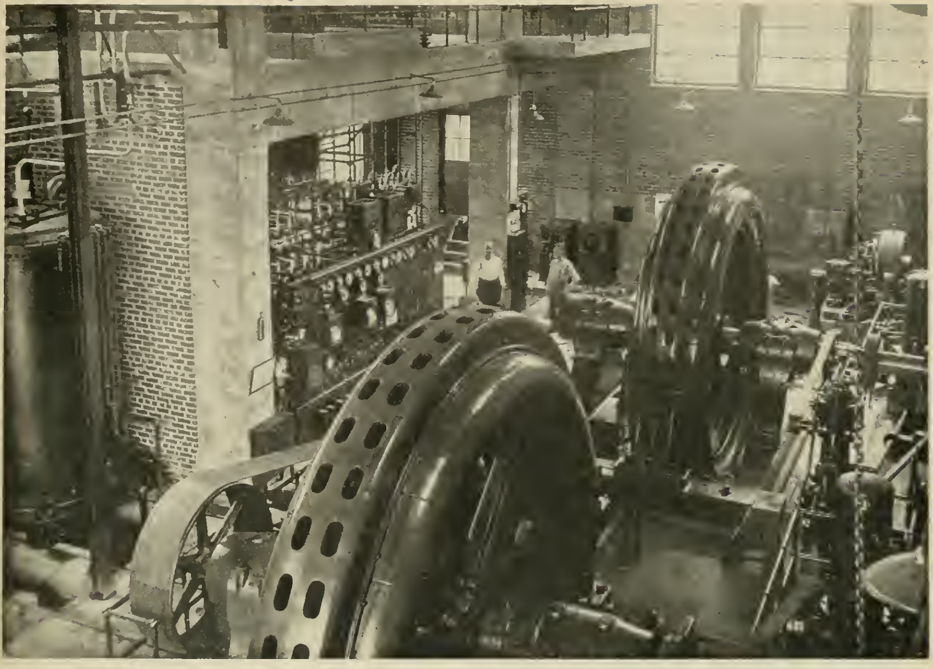
A 33,000 volt transmission line also runs to the Renfrew Molybdenum Mines at Mount St. Patrick, 15 miles from power house. This also is a three phase line using No. 8, 40% conductivity solid, copper-clad steel wire, which could be used, as total amount of power to be transmitted did not exceed 300 h. p.

The transmission system also included a 6600 volt, 3 phase line, 3 miles to Mr. M. J. O'Brien's farm at Barryvale. Conductors on this line consist of No. 9 B.W.G. galvanized steel, as amount of power to be transmitted was comparatively small.

Turbine runners and casings en route to the plant

Renfrew Substation.

The Renfrew Substation is a fireproof brick building with masonry foundation, concrete roof and basement. Into this station comes one 33,000 volt transmission line from Calabogie power house. The station contains three 1667 kv.a. single phase, oil-filled, General Electric transformers, 30,000 to 6600 volts; these transformers are cooled by forced oil circulation. They were manufactured for the Tallassee Power Company of Badin, N. C., but were never put into service on account of a change in the plans of that company. They were originally built for 60,000 to 12,000 volts and some slight changes were required to adapt them



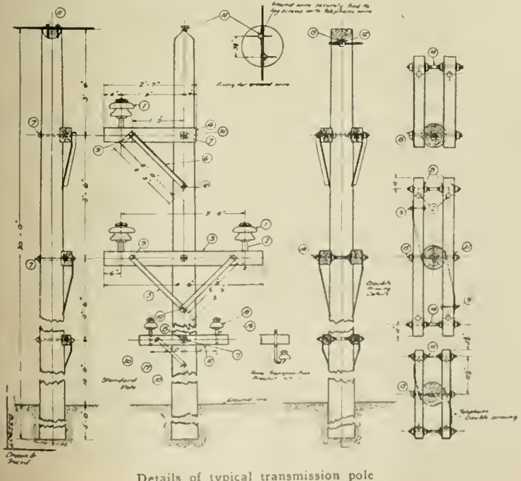
The power house interior, showing the two generators—Calabogie Light & Power Company

for the operating voltage at Renfrew. This resulted in securing a high factor of safety similar to that obtaining at the power house.

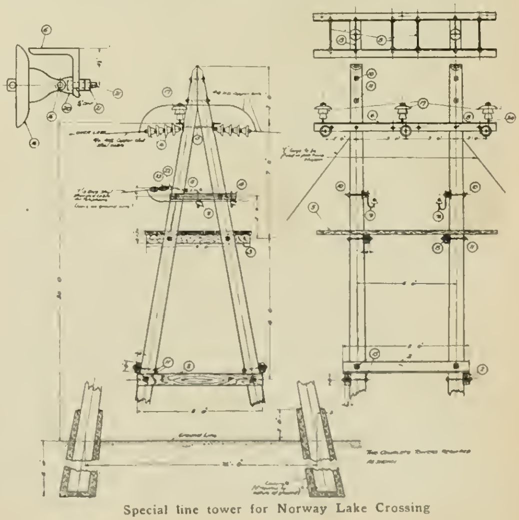
The high tension side of the transformers is protected by a Canadian Westinghouse oil circuit breaker and electrolytic lightning arrester.

A 6600 volt feeder was carried to the British Chemical Company, manufacturing explosives, and all demands for power by this company were supplied from the date of starting of power house until the British Chemical shut down after the signing of the armistice. A 6600 volt feeder also conneots with the Renfrew Municipal System and the entire load of this system has at times been carried by the Calabogie Light & Power Company.

The development described herein is owned and was built by M. J. O'Brien, Limited, Renfrew, Ontario. The following was the engineering staff: Consulting and designing engineers, Kerry & Chace, Limited; resident engineer, A. R. Whitelaw; superintendent of construction, F. C. Jewett; engineer of transmission lines, J. B. Harvey; chief electrical engineer, A. L. Mudge; assistant electrical engineer, H. R. McClymont.



Details of typical transmission pole



Special line tower for Norway Lake Crossing

The Electric Club of Toronto Opens 1919-20 Season with an Address by Brig.-Gen. C. H. Mitchell

Brig.-Gen. Mitchell, D.S.O., C.M.G., received a very enthusiastic reception at the first meeting of the Electric Club, on Friday, Sept. 26, and his talk, which had to do, in the main, with the work of the Intelligence Branch at the front, was of the keenest interest to the large number of electrical men who gathered to hear him. Gen. Mitchell thanked the club for the warmth of their welcome, and expressed his great pleasure at being back in Toronto and in Canada. Having been on the General Staff of the Second Army, engaged in the work of the Intelligence Branch, he pointed out that he was very closely in touch with the employment of electricity in that work at the front. The engineer had filled a very important place in the war and, indeed, it has been said by no less person than Lloyd George that this was an engineers' war. When he went to the other side he had early learned that one who had engineering education was the man who had an advantage over everyone else. Not only was the engineer particularly fitted for military work on account of his technical knowledge, but also by virtue of the habits of mind and the type of development which his training induced. The man who was in the habit of taking a lot of facts, analyzing them, making deductions, and arriving at the decision as to what to do and then putting that decision into effect was the one who was wanted in nearly every branch of an army. Whether it was in technical work, or handling a platoon or a battery of artillery, this was the type of man who came to the top. "I have no intention of disparaging the men of other professions," said the General, "but they were out of their spheres, the medical profession of course being excepted, as their work was in a class by itself. I felt sorry for the lawyer fellow because he was not doing in the war the kind of thing he had been doing at home before the war. You can quite see that the lawyer had nothing similar in his experience, while the engineer, whether commanding a platoon of infantry, or a battery of artillery, or on staff work, had had experience which prepared him for all phases of military operations. He had been accustomed to long hours and had the talent for application and the individual characteristics which go to make up a successful staff officer or a successful officer commanding men.

"In the staff work I could not help but realize how valuable the electrical man or the engineer was, and I always sought, in getting assistants, to secure a man who was trained as an engineer in some form or another and knew he would serve the purpose we wanted. I have in mind one young fellow who came to me in 1917 before the Battle of Messines, and whom I never let go afterwards. He was not particularly brilliant, but had engineering methods of doing things. In connection with the Battle of Flanders when we were working at a scheme for locating the enemy forces beyond Passchendaele and to foresee what the enemy would do to forestall our offensive, it was the greatest pleasure to know that this fellow could go to work and analyze all these various elements which formed the data on which the ultimate decisions were made. Often I went and worked for hours with him, figuring out what the enemy would do if attacked, where he had his reserves and the routes of approach by which he would bring up his supports.

"With regard to the electrical work at the front, one naturally thinks of its field as concerned chiefly with signal work, but that is only a very small part of it. The telephone service at the front was a magnificent success. Of course, it was carried on under tremendous difficulties. The signalling apparatus was one of the show places of the Second Army. The telephone exchange was quite as big and had more complicated instruments than there would be in a town or city of 50,000 people. During the Battle of Flanders, there were seven army corps in the Second Army, consisting of 28 divisions, which, along with auxiliaries, brought the number of men up to about three quarters of a million. And all of these had to have telephone and telegraph service. Where quick service was required the telephone was used, and where sure service was required and records had to be kept, the telegraph was used. The normal business at the army telegram stations was 2,000 messages a day. The telephone messages were never counted, but they became so numerous that steps had to be taken to cut them down and priority calls had to be established.

"All the other parts of the Intelligence work applied solely to the enemy. What we had to do was to try and get information of what he was doing or likely to do. The thing above everything else that kept one interested in the work was the tremendous game it was, matching the other side which was trying to get information about you and prevent you getting information about them. It was a great pleasure to think that the fellow on the other side was sitting at his own headquarters about 20 miles behind the lines, just as you were, in about the same kind of a house, with a lot of telephones and staff, under conditions similar to your own. In my spare time, when I had any, I used to wonder what the man behind the German lines was thinking of, for the psychology of the Germans was one of the most interesting things in the war."

Gen. Mitchell proceeded to explain some of the devices which were used for obtaining information, but requested that the details be not published. He also explained the sound ranging apparatus for the location of enemy artillery. Early in the war it had been the practice to place observers in trees, towers or on hill-tops to watch for the flash of the guns, endeavoring to synchronize the observations of a number on one flash and get the triangular determination of the distance by measuring the time between appearance of the flash and the approach of the sound. Even when a gun was down below a hill it was possible to see the "rays" from a flash. It was not long before the French evolved a new method of sound ranging. This was by the use of microphones placed behind the lines on a very long arc. The instrument by which the measuring was done was away back connected by wires with the microphones. The microphone is a combination of a telephone receiver and a cinema. The device can be used in fog or other conditions of poor visibility, but not when the wind is dead against it. Its findings were surprisingly accurate and it was no exaggeration when the sound rangers said they could locate within 25 yards a gun 5,000 or 10,000 yards back.

It was this kind of work, Gen. Mitchell said, that Professor Colborne, of the Toronto University, had been engaged in in Palestine, and he intended to carry out further experiments in connection with it. They also had at the University, Capt. Steele, who was wireless officer for the Canadian Corps, and he also proposed to carry on experiments.

When in Italy, Gen. Mitchell said he had noticed the traction methods used by the Austrians for their big guns. Some of these were 12, 14 or 16 inch howitzers which had to be transported independent of railroads. These very big guns had to be carried in sections, some of them taking as many as six trucks for this purpose. The leading truck had a petrol engine which generated electricity and had electrical connection with the following trucks, just as in a train of cars, and the power was applied by means of motors on the axles of the trucks.

Gen. Mitchell remarked that he had been very interested to observe the development in electric power plants as compared with what they had been when he had previously visited Italy in 1906. Practically all munition work and war operations were carried on with hydro electric power, for Italy has no fuel within her borders and so must depend on her water powers or on imported fuel. This necessitated the development and extension of existing plant. Unfortunately when the line broke two years ago, one of the largest plants in the Venetian plain was captured by the enemy, and Venice and other important cities were deprived of their power. After the armistice was signed, Gen. Mitchell went to visit these plants, and he said he was much struck with the extent to which they had adopted many things developed on this side of the water. In 1906 they were working along their own lines, but of recent years they had been taking to methods used on the continent, and he saw some things which were the products of our own engineers here in Ontario and in Canada.

Regarding the development of electrical devices and equipment during the war, Gen. Mitchell said if there were another war, which he did not suggest as a probability, Britain would be well equipped for carrying it on and electricity would play a much bigger part even than it had in this war. In the pursuits of peace and the operations of industry, too, the electrical apparatus which had been developed for war purposes, would prove of the greatest advantage and utility.

St. Lawrence Power and Navigation

Preliminaries are under way in connection with the proposed international scheme for the improvement of facilities for navigation on the St. Lawrence River and for the development of the great water powers of that stream. The Canadian and U. S. governments are reported to have agreed to submit the matter to the International Joint Commission for a report upon the feasibility and cost of such an undertaking. To this end, both governments have named representatives, whose duty it will be to prepare the questions to be laid before the International Joint Commission. The U. S. Government has appointed as its representative Lieut.-Col. Chas. Kellar, of the War Department, and the Dominion Government has chosen W. J. Stewart, of Ottawa, the Dominion hydrographer. In the meantime, in anticipation of the investigation, certain surveys have been carried on on behalf of the Dominion Government. The Hydro-electric Power Commission of Ontario, too, has been securing data and preparing plans, according to the recent announcement made by Sir Adam Beck.

Both from the aspect of improved navigation and availability of power, the scheme is of the greatest moment to Canada. If the St. Lawrence waterway were made to conform in depth to the new Welland Ship Canal, which is to have 25 ft. of water, with 30 ft. in the locks, nine-tenths of the seagoing vessels of the present time, it is stated, would be able to steam from the Atlantic to the head of the Great Lakes, and the 300-foot grain carriers which ply on the Upper Lakes and which now can proceed seaward only as far as Port Colborne, the Lake Erie terminus of the Welland Canal, would be able to carry their half-million bushel cargoes to Montreal, there to be discharged into ocean-going ships.

As to the power possibilities, it has been estimated that the flow of the St. Lawrence could generate three million horsepower of electricity, if not more; as yet a comparatively small proportion of this has been developed. Between Lake Ontario and Cornwall, where the St. Lawrence constitutes the international boundary line, it is estimated that one million horsepower could be delivered for common use in the two countries. The International Joint Commission will be called upon to consider by what method the navigation and power of the river should be developed, whether by canalization of the river channel itself, by the construction of storage dams at two or three points with lock gates, or by a system of canals parallel to the river, similar to, but on a larger scale than the present St. Lawrence canals.

Prosecuting for Theft of Current

A case of interest to electric lighting companies has been argued before Mr. Justice Coderre, in the Superior Court, Montreal. The question is whether the Provincial Government has exceeded its powers in granting to the Montreal Light, Heat & Power Consolidated authority under its charter to prosecute customers for stealing power.

Judge Leet convicted a Montreal merchant for stealing power and fined him $100. The company prosecuted under its power conferred by Section 26 of its charter, granted by the Provincial Government, the fine going to the company. The merchant asked the Superior Court for a writ of certiorari against the company, his counsel, Mr. Fitch, submitting that the section of the charter under which the prosecution was made was unconstitutional, and for this reason: The charge against his client was virtually that of theft. Theft was a criminal offence and fell under the exclusive jurisdiction of the federal government. The provincial government could not legislate on criminal law; and while it had, of course, the right to give the respondent company its charter, it had no authority to put therein a section giving the company the power to prosecute people in cases of theft.

Counsel, in support of his argument, referred the court to the case of the King vs. Lawrence. In this case it was shown that the province of Ontario passed a Licensing Act and put therein a clause providing that anyone who kept a witness away from giving evidence in any prosecution under the act was guilty of a crime and liable to a penalty of $50. That section, Mr. Fitch continued, was held by the Supreme Court to be unconstitutional inasmuch as the crime which the section foresaw was in effect subornation to perjury, a crime recognized by the Criminal Code.

"The courts have held," counsel said, "that where the act charged is already a crime within the provisions of the Criminal Code the provincial governments cannot pass any law dealing with it. This legislation belongs exclusively to the federal government. Moreover, it is provided that all men shall be amenable to equal punishment for a similar offence, yet while a man is liable under the Criminal Code to ten years' imprisonment for theft, if he steals power from the company respondent—the crime of theft—he is liable to a fine of not more than $100. It was never the intention of the law to give two different punishments for the same crime."

Walter R. L. Shanks arguing the case for the respondent company, denied that the offence charged against the petitioner was a crime within the meaning of the Criminal Code. In the instance complained of there had been a violation by the petitioner of the property and civil rights of the respondent company, and it was within the jurisdiction of the provincial legislature to legislate in relation to the imposing of punishment by fine for infraction of the laws of the province made in relation to any matter concerning the incorporation of the companies with provincial objects and property and civil rights.

Mr. Fitch admitted that the company's property rights might have been assailed, but as charged against his client it was the case of theft, and theft was a crime beyond legislative authority of the legislature.

"If," counsel added, "I put my hand in my learned friend's pocket and take his watch he personally is the sufferer because his property has been taken and I am a thief but, according to his argument, if my client steals from his client electric power, that is not a theft. It seems to me the argument will not stand."

Counsel argued that there was a further wrong done to his client in the fact that as the company proceeded it was their inspectors who made the case. They examined the meters and if anything was found wrong it was put right and then complaint entered against defendant. In order to be just, the complaint should be made before the alleged wrong was repaired so that the defendant could test the wrong, whereas when the alleged wrong was removed there could be no test and no fair defence.

Mr. Shanks submitted that in any event the Superior Court had no jurisdiction to issue a writ of certiorari inasmuch as petitioner had a right of appeal before the Court of King's Bench and certiorari proceedings only lay when there was no appeal.

The Wendigo Power Company

The Wendigo Power Company, Limited, has recently been incorporated, with head office at Guelph, Ont., for the purpose of generating and distributing electrical power, and also of taking over certain rights held in trust by Robert Lucy, M.D. The rights consist of a lease from the Ontario Government of the power rights on Wendigo Lake, and certain parts of the Blanche River, and also rights of the storage for power purposes on Wendigo, Skeleton, St. Anthony, Larder and other lakes and streams in the Temiskaming district, The drainage covers some 340 square miles. The company is also authorized to cut and remove timber on parts of the grounds adjoining the devolopment of power and to purchase 190 acres of land through part of which the pipe line will pass and upon which the power house is to be erected.

The location of the plant is in the township of Marter on the East branch of the Blanche River in the District of Temiskaming, about six and a half miles from the town of Englehart, and is in the proximity of a large and active mining area.

The development of 2,000 h.p. will be proceeded with immediately. The necessary funds are available from sale of stock, the estimated cost being $222,108. It is also the intention of the directors to develop the full capacity of 3,500 to 4,000 h.p. immediately it is required.

The engineers, Messrs. Sutcliffe and Neelands, in their report, estimate the average flow at 270 c.f.s., which, on a 143-ft. head, would give 3,500 h.p. continuous 24-hour load, figuring 80 per cent. efficiency on the wheel shaft. They state that they do not believe the spring freshet run off can be entirely controlled, but that the major portion of the flow can be regulated. Five feet of water on Larder Lake, which has an area of 13 square miles, would hold 65 mile feet; 10 feet on Skeleton Lake, 14 mile feet; 15 feet on Wendigo Lake, 25.5 mile feet; 5 feet on St. Anthony Lake, 12.2 mile feet, and 5 feet on Raven Lake, 12.2 mile feet, or a total available storage of 129 mile feet. Besides that which would be taken care of by the power plant itself when operated to full capacity, they figure that the spring run off would be 176 mile feet.

The engineers have given estimates—one for 2,000 h.p. development and one for 4,000 h.p. development. In the former instance they figure on a yearly flow of 170 c.f.s., and the latter 270 c.f.s. The figures of the estimate on the 2,000 h.p. development are given below. These costs include the excavation of a head-race through rock, the construction of a gate-house with the necessary locks, gates, etc., and seven foot wood stave flume to the surge tank, which would be of steel construction on a rock and concrete foundation. From the surge tank a separate penstock to each unit is figured on. The power house would have a concrete substructure with frame superstructures, to contain two 2,000 B. h. p. units, or two 1,000 B. h. p. units, according to the extent of the development, those units to be directly connected to electric generators. It will be unnecessary to build any dams unless more than 2,000 h.p. is developed.

Estimate on 2,000 h.p. Development

Item	Cost	Annual Cost
Gate House, Headworks and Head Race (including all rock work)	$20,000.00	$ 250.00
Pipe Line A, $12.00 per foot	72,840.00	3,000.00
Penstocks	1,500.00	60.00
Surge Tanks	18,000.00	600.00
Power House	16,000.00	160.00
Switching	7,000.00	210.00
Tail Race	1,000.00	
Turbines	20,000.00	1,200.00
Generators	25,000.00	1,500.00
Total	$181,340.00	$6,980.00
Engineering and Superintendence	$18,134.00	
Contingencies	18,134.00	
Interest during Construction	4,500.00	
Operation		$3,500.00
Insurance		6,500.00
Annual Interest on Stock Issue of $275,000.00 at 10%		27,500.00
Totals	$222,108.00	$44,430.00

Or for 2000 h.p. installed at the switch board the capital cost would be $111.00 per h.p.

If the 3,500 h.p. development were undertaken, this would entail a further expenditure of $35,000 for the Wendigo dam and $25,000 for other storage dams, besides increases in the cost of plant and equipment and engineering, bringing the total cost to $314,005, and the annual cost of $63,340.

Non-Twist Canopy Ring, Canada, Limited

Non-Twist Canopy Ring, Canada, Limited, has been incorporated to manufacture the non-twist canopy ring and other fixture fittings and parts used in connection with it. According to the prospectus the company has acquired rights which will enable them to establish branches in the United States and England and offices have already been taken at Majestic Building, Detroit, and at 3 Lombard Street, London, England. The directors of the company are: president and general manager, Frank D. Parmenter, who is also the inventor of the device, upon which patents are held by him in Canada, United States and Great Britain; vice-president, E. B. Merrill; secretary-treasurer, Frank Euston; directors, N. L. Martin, C. A.; I. H. Weldon; J. McIntosh Duff, (solicitor).

The company has been capitalized at $500,000, with equal amounts of preferred and common stock, and a present issue of $100,000 is being made. The preferred carries a dividend of 8 per cent. cumulative. The company have decided to give a preference in offering the first issue to the electrical trade, in connection with which special terms are being arranged.

Easy Justifying Higher Fares

Mr. W. T. Lynch, general manager, Quebec Railway, Light, Heat & Power Co., has prepared a statement for presentation to the Quebec City Council, in the defence of a request for higher fares, which shows up in a very striking way the increased cost of operation of street railways. Mr. Lynch is asking for a 7-cent cash rate, with 17 tickets for $1.00, an increase in workmen's ticket and a charge of two cents for transfers. It is proposed to give 11 workmen's tickets for 50 cents. The new scale proposed compares as follows with the existing one:

	Proposed.	Present rate.
Regular	17 for $1	21 for $1
Cash	7	6
Workmen	11 for 50c	7 for 25c
Transfer	2c	Free
School Children	Unchanged	

In defense of the advance the company submits figures covering increased costs of operation in various branches, as well as comparisons with other places in Canada and the United States. In the city street railway division the increase in materials in the past six years had been 114.7 per cent.

In the gas division there had been an increase of 127.3 per cent. Among the individual advances in costs were: 65.2 per cent. in anthracite coal; 132.4 per cent. in steam coal; 120 per cent. in cast iron pipe; and 171.4 per cent. in gas oil. Wages showed large advances. In the street railway department they had gone up 46.94 per cent.

One interesting item of costs was a comparison of new cars. The company, it is announced, is installing ten new P.A.Y.E. cars at a total cost of $185,000; in 1914 the cost per car was $8,200. These cars will be placed in operation on the system on October 15.

The trophy for the best decorated automobile in the Toronto Labor Day procession was awarded to the Electrical Workers' Union.

Hamilton Lamp Company, Limited

The Hamilton Lamp Company, Limited, have commenced operations in the manufacture of nitrogen-filled tungsten lamps. Their factory is located at 146 York Street, Hamilton. The factory operations are under the management of Mr. D. A. Sprinthall, who has had fifteen years experience in the manufacture of lamps in Canada and the United States. Mr. G. W. Nichol is sales manager of the company.

Steel Reflectors

Adams-Bagnall Electric Company, R. E. T. Pringle, Toronto, Canadian agents, have prepared an interesting catalogue, No. 175, describing and illustrating porcelain-enamelled steel reflector equipment for efficient and economical industrial lighting. The catalogue contains a quantity of useful information including the table of intensities and capacities given elsewhere in this issue.

Safety Frost

The Arts Electrical Company, Troy, N. Y., have placed on the market their "Safety Frost" compound which they claim represents the ideal way of frosting lamps. The operation only requires two minutes and is efficient, clean and permanent.

Seasonal Opportunities

At the first break of chilly weather a few days ago, a Toronto electrical dealer took advantage of the opportunity to push the sale of portable heaters. On a small table in his doorway, on a level with the inside edge of the sidewalk, he placed a glower-type heater, ran the cord in through the door and connected it up. People passing, even though they did not see the heater at a glance, felt the heat of it and instinctively stopped for further examination. Many additional sales can be made by utilizing seasonal opportunities of this kind.

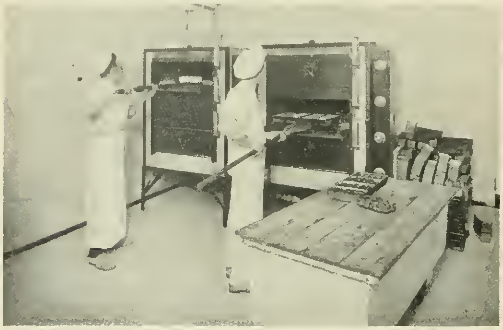
Daylight view of "Welcome" display by Toronto Hydro Electric System on the occasion of the visit of H.R.H. Prince of Wales

Night view of "Welcome" display of Toronto Hydro-Electric System, one of the handsomest of many shown during the Prince's visit

A Notable Installation of Electric Bake Ovens

A most interesting application of electricity to baking is the equipment installed at 300 Yonge Street, Toronto, by the Nut Krust Bakeries, Limited. This is a "cash and carry" business, the extent of which may be judged from the fact that on Saturday, September 20th, 2,328 sales were made over the counter. It is estimated that these sales represented close to 5,000 items. The almost negligible cost, comparatively speaking, of the electric power to operate the ovens for this large number of items may be judged from the further fact that the monthly bill of this company is only $75, or about $2.85 per day.

There are three ovens in this store with an electrical capacity of 18 kw. each. Other electrical equipment includes a 3 kw. water heater, 2 proof boxes of 1 kw. each, a 2 kw. stove, a 3 h.p. motor driving a dough mixer, and an exhaust fan. The three ovens were practically working to capacity on the date mentioned above and during the eight hours they were in operation turning out the 5,000 items, required the attention of five bakers. So satisfactory has this equipment proven and so economical in operation that the Nut Krust Bakeries are duplicating these ovens in three other Toronto stores which will be started at the corner of Danforth and Broadview, at Lansdowne and Bloor and at St. Clair and Dufferin. The same equipment will also be installed in St. Catharines, Ontario, where a suitable site has been located. These stores will be in operation before January 1, 1920. Within a year from the present date the manager, Mr. Williams, plans to have twenty-nine of these stores in operation at various points in Ontario.



View of Hughes electric ovens in Nut Krust Bakery

The cost of operation of these electric ovens is almost negligible

Mr. Williams is very enthusiastic about his electrical equipment, and claims that the saving in weight is particularly noticeable. While the loss in baking a 1½ lb. loaf, in the ordinary way, is about 2 ounces, Mr. Williams finds that with his electrical fittings the loss is less than 1 ounce. This feature incidentally means that electrically cooked bread will remain fresh much longer than the bread baked in the ordinary way.

The electric equipment used by the Nut Krust Bakeries was supplied by the Hughes Electric Heating Company of Canada. The same company will also supply duplicate equipment to the stores which are to be opened in the near future.

Personals

Mr. Lorne Webster, Montreal, has been selected a director of the Montreal Tramways Company.

Mr. W. A. Landry, B.Sc., formerly with the W. J. O'Leary Co., has joined the staff of the Montreal Armature Works, Ltd.

Mr. A. H. Morse has been appointed managing director of the Marconi Wireless Telegraph Company of Canada, succeeding Mr. Thomas Robb, who is vice-president for the ensuing year.

Mr. George J. Haid, electrical contractor, fixtures and supplies, has just completed new premises at Wellington Street, Preston, and is now in possession. He was previously situated on Queen Street.

Mr. Geo. D. Perry, general manager G. N. W. Telegraph Company of Canada, Toronto, was recently elected president for 1920 of the Old Time Telegraphers' Association which recently met in Cleveland, Ohio, at the 36th annual reunion.

Mr. Merz, the well-known electrical expert, of London, Eng., is now in South Africa for the purpose of investigating the electrification of certain sections of the South African railways and of advising the Government regarding the production of electric power in the Union generally.

Mr. John Davidson, of London, England, acting secretary of the B. C. Electric Railway Company, was a visitor to Vancouver for the first time since 1907. Mr. Davidson is a director of the B. C. Electric Company and managing director of the British Empire Trust Company with which the B. C. Electric Company is allied.

Mr. F. D. Egan, former works manager of the Pittsburgh Iron & Steel Foundries Company, has accepted a position in the general engineering department of the Westinghouse Electric & Manufacturing Company, at East Pittsburgh, where he will devote his entire time to the development of electrical apparatus for steel mill application.

The Chicago Mica Company has recently acquired the services of L. T. Frederick as consulting engineer and production manager. Mr. Frederick was formerly process engineer of the Westinghouse Electric and Manufacturing Company, Pittsburg, Pa., and has had a broad experience in the manufacture and application of all lines of electrical insulation.

The Wagner Electric Manufacturing Company, St. Louis, Mo., are distributing an illustrated bulletin on "Single-phase Motors." The application of these motors to various operations is also illustrated and explained. The same company have also just published a bulletin on "Distribution Type Transformers," and this bulletin further contains some useful information on the subject. "Some effects of operating conditions on transformer performance."

The Specialty Shop for Electric Appliances is as Essential as in Other Trades

The competition of the hardware merchant, the plumber, the drug store and the department store may prove the salvation of the electrical trade by forcing the electrical dealer to pursue aggressive tactics.

A walk about the shopping center of nearly any representative Canadian city will convince you that there is room for the small specialty shop. The hat store, the shoe store, the dealer in women's wearing apparel, the jewelry shop, and many others, all prove that the small dealer can successfully compete with the big store. The electrical specialty shop can compete and is now successfully competing with all attempts made by non-electrical stores to enter the electrical merchandising field. For example.

Mrs. Smith has been "sold" an electric fan by national advertising. While walking through Blank Brothers Department Store she sees a special sale of electric fans. She stops and inquires. "This fan is $7.98; this larger one is $12.00. Yes, this fan would be very nice for your living room. The blades are solid brass, best black enamel, and a felt covered base so that it won't mar your library table." To her question as to how much current it consumes she gets a vague answer from the saleslady. Mrs. Smith has heard something about "a. c." and "d. c." She doesn't know what it means but has an idea that it concerns fans and other electrical appliances The saleslady doesn't know either. The name plates state that some fans are a. c. and some d. c., but which to buy is the question. Perhaps Mrs. Smith buys a fan, perhaps she gets the right kind! Frequently she doesn't.

Here is where the electrical specialty shop has the advantage. By judicious use of newspaper and mail advertising Mrs. Smith should be informed that the best place to buy electrical goods is at an electrical shop. Perhaps after her experience in the department store she will be looking for an electrical shop.

Are you doing everything in your power to bring her into your store? If you are bringing her in you are competing successfully with the big merchant.

Individual vs General Service

A big organization with a more or less complicated system of selling, making change, carrying charge accounts, making deliveries, etc., is necessary for the large merchant. Theoretically it results in giving the customer the best service. It does give him the best service that can be hoped for from an organization of great size; but it does not give the customer the same sort of personal, intelligent service that he expects and gets from the small specialty shop. Two examples will illustrate the two kinds of service and will show wherein you in your electrical shop can compete with the large firms.

A man has bought a watch at the jewelry department of a large and progressive department store. Not having the cash with him, he requested that it be delivered c.o.d. to his office across the street. After waiting 24 hours and not receiving the watch, he calls at the jewelry counter and is told that Miss Smith is not there at present and "as she sold you the watch, I cannot tell you exactly where it is now but I will try to find out." The man giving this information starts off in search of an indefinite somebody who will tell him why the watch has not been delivered. After an impatient wait of perhaps ten minutes the customer is told that "the watch should have been delivered yesterday and I cannot understand why it was not, but Miss Smith will be back shortly and probably she will know about it." The customer has no choice and calls again in about an hour. Miss Smith is there and has gathered about her the heads of various departments. They are all very anxious to please the customer. They tell him again that the watch should have been delivered yesterday, but the fact remains that it has not been delivered. It is some place in the "system"! Where, perhaps someone could tell but that "someone" is not to be found.

Contrast the above with this case. This happened in the shop of a progressive dealer. The only person in the store was a young lady who knew her employer's business thoroughly. A customer came in with an electric iron being a worn out cord. She stated that the iron would not heat. One look at the cord showed the saleslady (who knew her employer's business) what was the trouble. It was the work of seconds to reach into a drawer, find the right kind of a cord with plug already attached, place it on the iron, connect it to an outlet under the counter and show the customer that the iron was heating properly. While making this demonstration the saleslady discovered that the handle of the iron was a little loose. It took but a few seconds more to tighten the handle and return the iron to the customer in perfect condition. The customer paid for the cord and left the shop entirely satisfied.

She had received personal service of the sort which enables the small electric dealer to compete successfully with the big system-bound corporation.

Points to Remember

With the foregoing examples in mind you will yourself discover many ways to make it a pleasure for customers to do their electrical shopping in your store. Here are a few hints. You will be able to amplify these and add many more:

See that your salespeople understand electrical terms and can explain them in simple language.

Don't overlook the good-will value of making minor adjustments and repairs "while you wait."

Never allow a promise to be made unless the salesperson knows that it can be fulfilled.

Wherever possible remember customer's name and use it in addressing her.

Beware the "I use it myself" argument. Some people have a very strong objection to such selling methods.

Feature strongly the slogan "Buy your electric goods at an electrical shop" and then make your electrical shop better than the others.

Be absolutely honest and truthful in all statements.

Don't sell an appliance which you know will not give good service. Better lose a sale than a customer.

Wait on one customer at a time, and give her all your attention.

Avoid employing a salesperson who has an unpleasant voice, appearance or mannerism.

If you are going to have a retail electrical store, don't let it become a workshop. , Keep your wiremen and the wiring end of your business out of sight.

Study your competitors—find out what people like about them and their stores; then go them one better. Find out what people do not like about other stores and avoid those things.

Here are some things customers object to:

1. Dirty floors and showcases.
2. Dingy looking walls.
3. A "forest" of fixtures covering the ceiling.
4. A general look of disorder about the store.
5. Dust covered appliances.
6. Odors of burning insulation, solder, etc., coming from workship in rear of store.
7. Salesman in his shirt sleeves.
8. Salesman with a cigar in his mouth while waiting on customer.
9. A salesman who talks too much of amperes, volts, resistance, cycles and other technical matters about which the customer is not informed.

Architects' Specifications — As They are and as They Should be

If Mark Twain had been an electrical contractor-dealer, he would have drawn a wealth of material for his humorous writings from the specifications of the average architect. Occasionally he makes a ludicrous attempt to go into details but latterly the architect is becoming more discreet, confining himself to the mere statement that the wiring in the building must be "according to the rules and regulations" of the Hydro Electric Power Commission of Ontario, or other authority, as the case may be.

A case in point recently came under the attention of a certain Ontario contractor. The specifications of the architect for wiring a client's house were prepared on a time worn form of some twenty years ago and were almost meagre enough to be harmless. It was a specification that might have been filled in the ordinary way, if the owner had been less watchful of his own personal interests, for perhaps two hundred dollars, or even a hundred and fifty. The final result of collaboration between the owner and contractor, however, was a very satisfactory equipment, costing about five times that amount, the completeness of which may be judged from the list given below. It is very important to note, however, that the cost of this installation was still well under 3 per cent. of the total cost of the home. Herewith is the complete list of equipment:

Basement.—Nine ceiling lights, 2 snap switches, one of them a 3-way (M.); 2 receptacles (power).

Ground Floor.—Outside front door: 1 light, flush switch. Vestibule: 1 light, flush switch. Hall: 1 ceiling light on 3-way (M.); 1 ceiling on two 3-way. Living Room: 5 side lights, one switch; 5 receptacles (light). Dining Room: 1 ceiling light, 2-point switch; 6 side lights, 3-way switch (M.); 2 receptacles (power). Sun Room: 1 ceiling light, 3-way switch (M.); 3 receptacles (light); 1 receptacle (power). Toilet: 1 ceiling light on flush switch. Passage: 1 ceiling light. Pantry: 1 side light. Kitchen: 1 ceiling light on two 3-ways; 2 receptacles (power). Maid's Room: 1 ceiling light on switch. Refrigerator: 1 ceiilng light. Rear Entry: 1 side light.

Second Floor.—Hall: 1 ceiling light on two 3-ways; 1 receptacle (light) (M.). Bedroom No. 1: 1 ceiling light on switch; two receptacles (light); 1 receptacle (power). Bedroom No. 2: 1 ceiling light on switch; 1 receptacle (light); 1 receptacle (power). Bedroom No. 3: 1 ceiling light on switch; 1 receptacle (light); 1 receptacle (power). Bedroom No. 4: 1 ceiling light on switch; 3 receptacles (light); 1 receptacle (power). Private Bath: 1 ceiling light on switch; 1 receptacle (power). Hallway and Closet: 2 ceiling lights on switch. General Bathroom: 1 ceiling light on switch; 1 receptacle (power). Sitting Room: 1 ceiling light on two 3-way; 2 receptacles (light); 1 receptacle (power).

Attic Storey.—Hall: 1 side light. Bedroom No. 1: 1 ceiling light on snap switch. Bedroom No. 2: 1 ceiling light on snap switch. Bathroom: 1 ceiling light on snap switch. Storeroom: 1 side light.

It is of value to note in connection with this installation that a distinction was made between the base receptacles for light and power. There is an element of danger in using such a small load as the ordinary floor lamp requires on a circuit fused to carry, perhaps, a one or two kilowatt heater. By using different types of receptacles this matter adjusts itself automatically because heavy power load cannot be plugged into lighting receptacles nor light load into power receptacles.

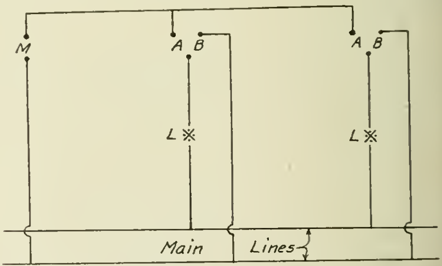
In installing power receptacles, the owner, of course, had in mind that auxiliary electric heating is becoming more general every day. These receptacles are 20 amperes, flush type.

Bell System.

A special bell operated from the front door is placed in the back stairway. A buzzer in the kitchen operates from the dining room floor tread. In addition there is an 8-point annunciator in the kitchen which operates from the sunroom, living room, sitting room, bedroom No. 3, bedroom No. 4, general bathroom, second floor hall and back door.

Telephones.

The telephone lines are run in in conduit and, within the building, connect the pantry, sitting room and No. 4 bedroom; the pantry acting as a sort of central point. In the sitting room and bedroom jacks with flush plates are installed and these two points can be signalled by a call bell from the pantry.



How to wire for master switch control. M = Master; L. L. = lights; A B, A B, = 3-way switches which ordinarily control the lights

Electric Range.

A special circuit direct to the kitchen made provision for a 100 ampere electric range, which has since been installed.

The Master Switch.

A master switch was located in the upper hall and placed about six feet from the floor so as to be well above the ordinary line of switches; it is a rotary (flush) so as to be easily distinguishable from the other switches. Note that the Master Switch controls one light in the laundry (basement) and three on the ground floor (sun room, hall, dining room). A sketch of the master switch connection is given herewith.

How to Handle Electric Appliance Repairs

By C. M. Jamison[*]

The subject of Appliance Repairs, while one which does not lend itself to spectacular treatment, is, in my opinion, one of the most important components of the successful merchandising of electrical apparatus. It is impossible to treat the subject in the abstract, and do justice to it, by reason of the fact that experience shows it to be so closely allied to general sales policies and having such direct influence on their ultimate success or failure that they must be jointly considered.

Fundamentally, it may be said that the merchant who has successfully solved this perplexing subject will find, as a result, a constantly growing clientele, not alone for his repair department, but for his mechandising department as well, for it is but human nature to patronize the store that with the minimum of inconvenience assists one to a satisfactory solution of the petty annoyances incident to the use of mechanical or electrical devices of whatever nature. An evidence of this fact is to be found in the attention discriminating buyers give to the questions of responsibility of a concern and the service such concern sells with its product. It is safe to say in, for instance, the automobile business, the prosperity of most of our large and successful agents has as its foundation a satisfactory repair and service policy, without which the best car made is but a nuisance.

Get Close to Customers

We are catering to and deriving our existence from utility and labor-saving articles, hence this feature of our business touches directly the daily life of our customers, in consequence of which it is of relatively greater importance than is service to an article used largely for pleasure.

With these remarks on the importance of this prosaic subject, I will now lay before you in a broad way our merchandising policies and will attempt to point out how our appliance repair policies dove-tail in.

The problem of merchandising electric current consuming devices is not materially different from that facing merchants of other utility articles, and when we attempt to set ourselves apart and construct special conditions that clash with the accepted and underlying principles of merchandising, we are simply building obstacles in the way of ultimate success.

Methods of Procedure.

With the exception of minor changes to meet the variables in merchandising problems, we probably all proceed in somewhat the following manner:

(a) We select the articles to be sold from the standpoint of merit and the satisfaction they will give our customers.
(b) We see to it that in each case we have a sufficient margin of profit to enable us to properly merchandise.
(c) We then build a sales force which we educate and prepare for its task.
(d) And then lay out our advertising campaign, with its many ramifications, in such a manner as to produce the results desired.

All that we have done is to create a condition of affairs, which is designed to

(a) Secure the attention of prospective buyers.
(b) Induce them to have confidence in us and our employees.
(c) Educate them as to the merits of our merchandise, the stability of our business, and the satisfaction to be derived from dealing with us.
(d) Create a desire within them for our goods and our service.
(c) Secure their will to act and close the transaction.

If this is a fair statement of facts the importance of "service," which of course, includes repairs, becomes immediately apparent. Apply "poor service" to any one of the above and see how it affects the whole.

Do Away With Old Methods

In speaking of our individual efforts in the merchandising field I wish to say that except in one or two instances we are in the merchandising business for profit and to-day have no sympathy for the policies in vogue some years back whereby central stations justified the sale of appliances at a loss, by reason of the fact that they used electric energy. At a certain stage of the development of appliances there was an element of reason in the policy, but it seems to me that the justification lay in gaining impetus for the business and encouraging development work in the shortest possible time, and not in the fact that the article used electric energy—that day has passed and now has come a time when electrical appliances can and should be merchandised at a reasonable profit.

We believe that the maximum distribution of the product can best be had through many sources of supply widely scattered throughout our city and conducting their business on a legitimate and profitable basis.

Our place in such a scheme of affairs is perfectly evident, our merchandising department becomes one of you—a retailer of electrical merchandise—conducted on accepted principles and at a profit. Probably no one of you must work harder than I do to produce such results, and unless I show net profits, I fail in business as inevitably as do you, and in connection with this it must be remembered that of all Milwaukee dealers, my department probably carries the heaviest overhead.

Experience teaches that the more progressive and active is the central station in its merchandising, the greater the progress of all dealers, provided only that the dealers have by honest methods built up a clientele of their own—and it is an accepted principle in our great industry that prosperity, or lack thereof on the part of a central station affects directly and in like measure the prosperity of the thousands in the community served, who depend on the electrical industry for their livelihood.

Attracting Attention.

In merchandising we will use the accepted methods of gaining the attention of prospects—just as our successful department stores use special sales for this purpose. We do likewise and in a measure warranted by our business.

We work for the confidence of our customers and of you gentlemen whose confidence and good will we so earnestly desire. We attempt to educate our customers to the use of appliances and as we are successful in this effort the business in Milwaukee will grow alike for you and for us.

I can best express our conception of the repair problem by saying that as the electrical appliance is a utility article, directly affecting the daily life of the housewife in particular, and every member of the household in general, in order to be satisfactory, it must be reliable, and when out of order it should be promptly and economically repaired.

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[*] Before Milwaukee Convention.

With this as a basis for action, we divide repairs as follows:

(a) Premises Repairs.
(b) Shop Repairs.

And these are subdivided as between

(1) Repairs covered by guarantee.
(2) Repairs not covered by guarantee.

Under the heading of "Premises Repairs" we class all repairs that can be made efficiently and quickly by our trouble or service men.

Repairs Made on Premises

Palpably it is a waste of time and money, to say nothing of the aggravation caused the customer over the delay, to call in for repair a washing machine in which the only trouble is a slipping belt, a sewing machine motor on which the cork driving wheel has become worn, an iron on which the cord has been broken, probably at the terminal plug, and it is not our intention to do so. When such a condition is developed at the time of complaint, we send a man to the premises capable and equipped to make the repair.

Under the heading "Shop Repairs" are included all repairs not made on the premises, whether repaired in our own shop or returned to the manufacturer for repair.

Our guarantees conform to the guarantees given by the manufacturers, and when the nature of the trouble permits we make repairs under the guarantee, furnishing labor and ~~calling on the~~ manufacturers for the needed material.

When the needed repair is not covered by guarantee it is handled on the most economical basis that insures satisfaction to the customer.

As an indication that the system is equitable, satisfactory and properly conducted, I might say that our repair department is not only self sustaining, but returns a fair profit after all legitimate charges have been absorbed.

For those who desire more specific information, I set forth the routine of handling the different kinds of repairs. We, of course, have appropriate forms for each transaction. These I simply mention as their exact form is designed to fit in with our theory of internal organization and probably would be of no material value to the average retail establishment.

The form for a repair of this nature is made up by either the clerk receiving complaint or the telephone operator who takes such messages, and gives information necessary for the service man to properly equip himself before calling at the premises. It shows whether or not repair is under guarantee, material used, time spent, and provides space for customer's signature. This form serves as authority bill, when a charge to the customer is in order and at the same time by an appropriate use of stock, charge and credit account numbers clear stock and places profit on the job in its correct place.

In this case the appliances are either brought in by the customer or ordered picked up by our delivery wagons. In the first case a suitable form in quadruplicate is made up by the clerk receiving the article. This form gives substantially the same information as above, and in addition serves as an order on shop to make the repair and for its return to the customer, or to the appliance shop "to be called for," as the case may be.

When it is necessary to pick up the appliance, the same form is used, but No. 1 in such case accompanies the route sheet which goes to the delivery department and has clipped to it a suitable tag in three sections, first section serving as customer's claim check, second section as appliance department record, and third section remaining always attached to the article to be repaired.

When it is found necessary to return an article to the factory for repair, the system set forth for shop repair is followed and in addition a purchase order covering the repair is sent to the factory and charge to customer is made based on our cost, plus transportation.

Always Make Friends

We believe this to be a well balanced system, but in order that it may be effective and secure satisfactory results, both for the customer and the company, all parties to the transaction must recognize the desirability of orderly haste and unfailing courtesy to the customer, for through these we not only repair an appliance, but gain a friend, whose attitude is receptive when some time in the future we say, "let us supply your electrical needs."

Speaking of repairs in general I will say that in my opinion we should use due care in the selection of our stock and see to it that we handle no article not honestly and well constructed, for the sale of poor merchandise invariably reacts in a manner that does permanent injury to a business.

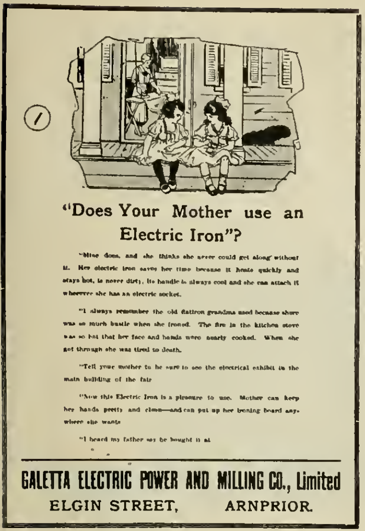
It is our duty to see that where a defect develops in an appliance within the guarantee period, our customer is protected, for he pays for this protection in first cost.

When an appliance which has been in service for a period beyond the guarantee needs repairing, it is our duty and to our interest to see that a workmanlike repair job is done and one as quickly as conditions permit. For such job the customer should pay a reasonable price based on the cost of such job, plus a reasonable profit.

It is well to remember that whenever the public finds the cost of an article out of service, excessive, it will do without, or use a substitute.

The Wagner Electric Manufacturing Company, St. Louis, have issued a very complete and useful bulletin, No. 120, entitled "Manual of Electric Testing." This is a revised edition of a manual published some years ago by the same company.

This illustration shows the illumination at the corner of King and Yonge streets, Toronto, on the occasion of the recent visit of the Prince of Wales. The installation was made by the Earle Electric Company, and consisted of 80 reflectors equipped with 500 watt lamps. The reflectors were Benjamin type and "Abolites." Units were placed approximately 90 feet from the street level and from 8 to 10 feet apart.. The conditions on this corner lent themselves admirably to a temporary installation of this sort. Three of the buildings are new and the various flats are equipped with base-board outlets, so that it was only necessary to run the wiring through the buildings and plug into these outlets. The particularly attractive decorations on these buildings showed up as well by night as during the day, owing to this effective system of illumination.



①

"Does Your Mother use an Electric Iron"?

"Mine does, and she thinks she never could get along without it. Her electric iron saves her time because it heats quickly and stays hot, is never dirty, its handle is always cool and she can attach it wherever she has an electric socket.

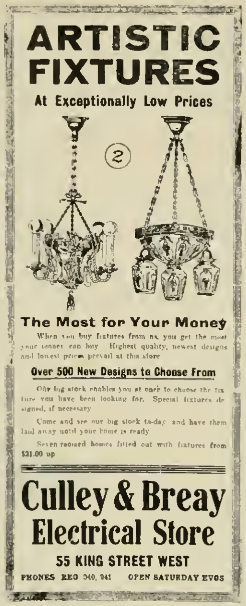
"I always remember the old flatiron grandma used because there was so much bustle when she ironed. The fire in the kitchen stove was so hot that her face and hands were nearly cooked. When she got through she was tired to death.

"Tell your mother to be sure to see the electrical exhibit in the main building of the fair

"Now this Electric Iron is a pleasure to use. Mother can keep her hands pretty and clean—and can put up her ironing board anywhere she wants

"I heard my father say he bought it at

GALETTA ELECTRIC POWER AND MILLING CO., Limited
ELGIN STREET, ARNPRIOR.



ARTISTIC FIXTURES
At Exceptionally Low Prices

②

The Most for Your Money

When you buy fixtures from us, you get the most your money can buy. Highest quality, newest designs and lowest prices prevail at this store

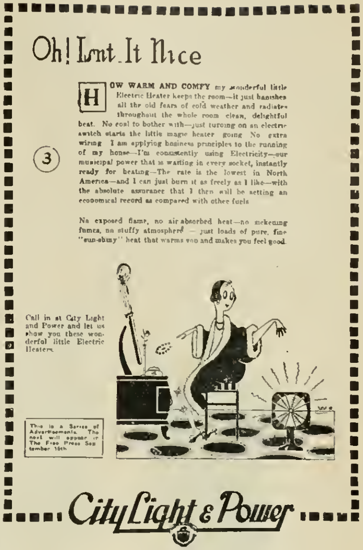
Over 500 New Designs to Choose From

Our big stock enables you at once to choose the fixture you have been looking for. Special fixtures designed, if necessary

Come and see our big stock to-day and have them laid away until your home is ready

Seven roomed homes fitted out with fixtures from $21.00 up

Culley & Breay Electrical Store
55 KING STREET WEST
PHONES REG 340, 341 OPEN SATURDAY EVGS



Oh! Isn't It Nice

③

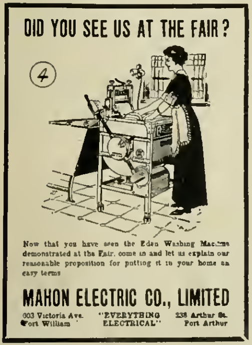
HOW WARM AND COMFY my wonderful little Electric Heater keeps the room—it just banishes all the old fears of cold weather and radiates throughout the whole room clean, delightful heat. No coal to bother with—just turning on an electric switch starts the little magic heater going. No extra wiring. I am applying business principles to the running of my house—I'm consistently using Electricity—our municipal power that is waiting in every socket, instantly ready for heating—The rate is the lowest in North America—and I can just burn it as freely as I like—with the absolute assurance that I then will be setting an economical record as compared with other fuels

No exposed flame, no air absorbed heat—no sickening fumes, no stuffy atmosphere — just loads of pure, fine "sun-shiny" heat that warms you and makes you feel good.

Call in at City Light and Power and let us show you these wonderful little Electric Heaters.

This is a Series of Advertisements. The next will appear in The Free Press September 16th

City Light & Power



DID YOU SEE US AT THE FAIR?

④

Now that you have seen the Eden Washing Machine demonstrated at the Fair, come in and let us explain our reasonable proposition for putting it in your home on easy terms

MAHON ELECTRIC CO., LIMITED

603 Victoria Ave. Fort William	"EVERYTHING ELECTRICAL"	238 Arthur St. Port Arthur

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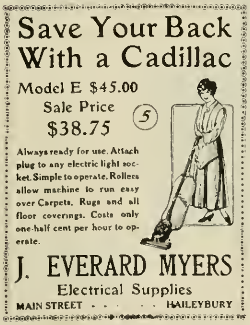


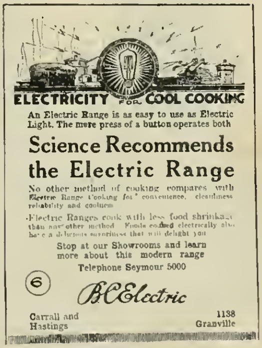
Save Your Back With a Cadillac

Model E $45.00
Sale Price
$38.75

⑤

Always ready for use. Attach plug to any electric light socket. Simple to operate. Rollers allow machine to run easy over Carpets, Rugs and all floor coverings. Costs only one-half cent per hour to operate.

J. EVERARD MYERS
Electrical Supplies
MAIN STREET - - - - - HAILEYBURY



ELECTRICITY FOR COOL COOKING

An Electric Range is as easy to use as Electric Light. The mere press of a button operates both

Science Recommends the Electric Range

No other method of cooking compares with Electric Range Cooking for convenience, cleanliness reliability and coolness

Electric Ranges cook with less food shrinkage than any other method. Foods cooked electrically also have a delicious savoriness that will delight you

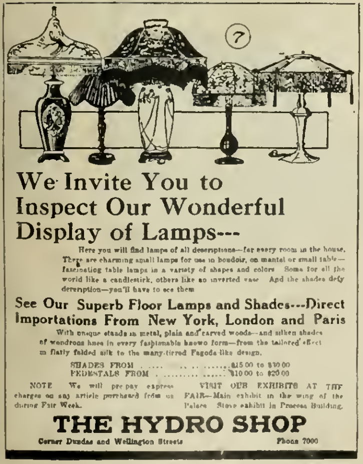
Stop at our Showrooms and learn more about this modern range

Telephone Seymour 5000

⑥

BC Electric

Carrall and Hastings	1138 Granville



⑦

We Invite You to Inspect Our Wonderful Display of Lamps---

Here you will find lamps of all descriptions—for every room in the house. There are charming small lamps for use in boudoir, on mantel or small table—fascinating table lamps in a variety of shapes and colors. Some for all the world like a candlestick, others like an inverted vase. And the shades defy description—you'll have to see them

See Our Superb Floor Lamps and Shades---Direct Importations From New York, London and Paris

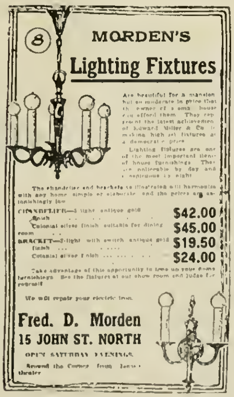
With unique stands in metal, plain and carved woods—and silken shades of wondrous hues in every fashionable known form—from the tailored effect in flatly folded silk to the many-tiered Pagoda-like design.

SHADES FROM .... $15.00 to $30.00
PEDESTALS FROM .... $10.00 to $20.00

NOTE. We will pre-pay express charges on any article purchased from us during Fair Week.

VISIT OUR EXHIBITS AT THE FAIR—Main exhibit in the wing of the Palace. Stove exhibit in Process Building.

THE HYDRO SHOP
Corner Dundas and Wellington Streets Phone 7000



⑧

MORDEN'S Lighting Fixtures

Are beautiful for a mansion but so moderate in price that the owner of a small house can afford them. They represent the latest achievement of Edward Miller & Co in making high art fixtures at a democratic price.

Lighting fixtures are one of the most important items of house furnishings. They are noticeable by day and conspicuous by night.

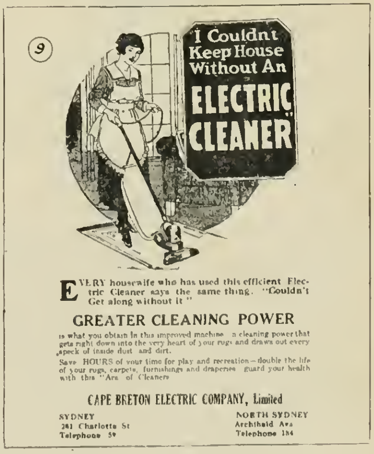
The chandelier and brackets in illustration will harmonize with any home simple or elaborate and the prices are astonishingly low

CHANDELIER—5 light antique gold finish ...	$42.00
Colonial silver finish suitable for dining room ...	$45.00
BRACKET—2-light with switch antique gold finish ...	$19.50
Colonial silver finish ...	$24.00

Take advantage of this opportunity to tone up your home furnishings. See the fixtures at our show room and judge for yourself

We will repair your electric iron.

Fred. D. Morden
15 JOHN ST. NORTH
OPEN SATURDAY EVENINGS
Around the Corner from [illegible] theater



⑨

"I Couldn't Keep House Without An ELECTRIC CLEANER"

EVERY housewife who has used this efficient Electric Cleaner says the same thing. "Couldn't Get along without it"

GREATER CLEANING POWER

is what you obtain in this improved machine, a cleaning power that gets right down into the very heart of your rugs and draws out every speck of inside dust and dirt.

Save HOURS of your time for play and recreation—double the life of your rugs, carpets, furnishings and draperies, guard your health with this "Ace of Cleaners"

CAPE BRETON ELECTRIC COMPANY, Limited

SYDNEY 281 Charlotte St Telephone 59	NORTH SYDNEY Archibald Ave Telephone 184

Canadian Central Stations and Contractor-Dealers are doing some very effective advertising. (1) Arnprior, (2) Hamilton, (3) Winnipeg, (4) Twin Cities, (5) Haileybury, (6) Vancouver, (7) London, (8) Hamilton, (9) Sydney.

What is New in The Appliance Field

The Carpet Washer

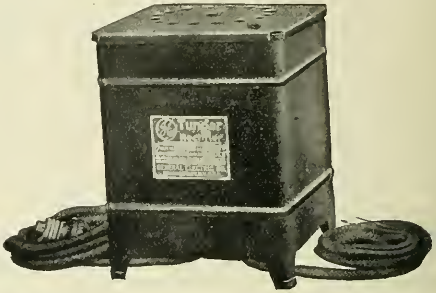
The carpet washer recently demonstrated at various points in Canada, and which will be placed on the Canadian market immediately, we understand, by the Hamilton-Beach Company, of Racine, Wis., was very favorably commented upon by those who saw it in operation. It would appear that the company's claim that all the delicate colors and beautiful shades of your worn carpets are brought back by this washer is as near to being a fact as is humanly possible. It is claimed also that the washing suds used will not injure the most delicate fabric; the special compound prepared under a special formula by this company contains no harmful chemicals or animal fats. For large residences, hotels, public buildings of all kinds, this machine should naturally find a ready market.

You can tell it's doing good work by the expression on the lady's face

Small-Sized "Tungar" Rectifier for Charging Storage Batteries

A small-sized battery charger has been developed by the Canadian General Electric Co. for charging storage batteries from a 115-volt, 60-cycle alternating current circuit. It has been designed especially to meet the requirements of the automobile owner who desires to charge his starting and lighting battery at home or in a private garage. This device will charge 1 three-cell battery at 5 amp., 2 three-cell batteries at 3 amp., 3 three-cell batteries at 1½ amp., 1 six-cell battery at 3 amp.

The essential parts are a transformer for reducing the voltage, and a Tungar bulb, for rectifying the current. Both are contained in a sheet-metal case. The operation is simple. The device is set on the floor or on the running board of the car, or it is hung on the wall. The direct-current leads are connected to the battery with the spring clips which are provided, and the attaching plug is screwed into a convenient lamp socket. The charging starts immediately. Another sized rectifier of this type which has just been brought out by the same company is designed to be used by automobile dealers and garage owners. It will charge from one to four 3-cell batteries at rates of from 3 amp. to 5 amp.

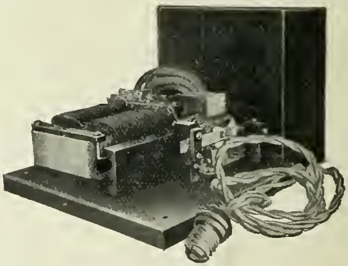


It consists of a small transformer and a rectifying bulb

The Cambridge Rectifier

All makers of storage batteries caution the user against permitting batteries to remain in a discharged condition even though temporarily not in use. All batteries, whether in the motor car, motor boat, laboratory or other service, require frequent charging, and where an automatic means, such as lighting generator in a motor car, is provided, it frequently happens that occasional charging from an additional source of current is necessary.

For such cases, the Cambridge Rectifier fills a useful need, and an occasional charge for a few hours will keep the battery in prime condition. Where no automatic means of charging is provided, such a rectifier becomes an absolute necessity. Aside from the convenience of always having your battery ready when you want it, you will probably save its cost in longer battery life, in battery rentals and charging fees from service stations.

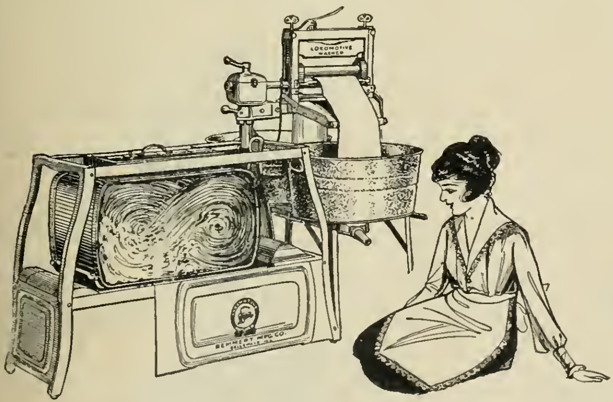


For charging batteries at home

Storage batteries must be charged on direct current and connected to the source of current so that this current will flow through the battery in the correct direction, and in one direction only. Unfortunately, practically all public lighting systems furnish only alternating current in which the current rapidly reverses its direction of flow, passing first in one direction and then the other. A storage battery connected to such a source of current would be quickly ruined. The Cambridge rectifier was designed to permit this alternating current to be used safely and economically to charge any battery from this alternating current, which would otherwise be useless for this purpose. The current on entering the rectifier is passed through a transformer to lower its voltage. The current is then conducted through a vibrating reed which oscillates to and fro in unison with changes in direction of the alternating current. On the end of this reed is a contact point which makes contact with another similar point connected to the storage battery whenever the current is flowing in the correct direction to charge the battery, and disconnects the battery from the circuit, when the current is flowing in the wrong direction. Thus impulses flow into the battery in one direction only, and the instrument is so constructed that it automatically charges in the right direction regardless of which direction the battery is connected.

Eliminating Wash Day

The great drudgery of wash day is now being so acutely brought home to every housewife, that both she and the electric dealer are on the "qui vive" for some type of washer which will eliminate the many concealed objectionable features of the old fashioned way and furnish a neat, compact, smooth running, quiet, powerful, efficient, economical, reliable and simple machine of few parts, made of metal, requiring no special wiring, with no wood or metal drums, or insides to remove and clean, free from springs and foot rods which dig holes in the linoleum or floor; not bulky cobwebby or forbidding, but very attractive in appearance.



Clothes thrown in form of figure 8

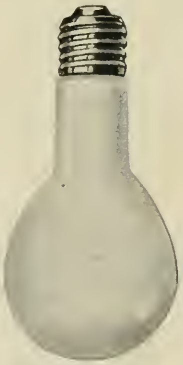
The inventor of the Locomotive Electric Washer claims to have this long looked for master-piece mounted in a well braced metal framework sixteen inches wide and four feet long. He says it is the neatest and most compact eight sheet washer conceivable. He has apparently taken a copper clothes boiler, increased the size, changed the shape and with wide brass bands strapped it to a double cast iron V-shaped track running on grooved rollers, two on each side thus carrying the weight, perfectly balanced, of about five buckets of water which about half fills it. A simple piston action with six inch stroke throws the water twenty-six inches forcing all the suds through all the clothes twice every second in the form of a figure 8. The boiler inside is perfectly smooth with flat bottom under which is located a heater for gas, oil or electric, and the very violent agitation of the water especially if same is heated or boiling, steams, cleanses and sterilizes the clothes with extreme rapidity. The clothes moving slower than the water scarcely touch the walls, and there is complete absence of friction and wear. The wringer can be lifted off and put underneath the machine, an ironing board, fitting snugly, then forms a table top 31 inches high.

The Locomotive Washer comes equipped with quarter h.p. motor, quick detachable reversing safety swinging wringer, ironing board, gas heater and tube, oil or electric burner, copper or galvanized boiler as preferred. It can be driven by gas engine or windmill power and the cost of the motor deducted. The possibilities of using it as a churn and dish washer are apparent. It is fully guaranteed.

The Lyons Electric Company of Brantford, Ont., have contracted for the distributing and manufacturing rights for all Canada, and are now signing up territory.

Mazda Lamp with Tipless Bulb

A Mazda lamp of a new type has just been placed on the market. This is a 50-watt lamp, designated as "C-4." It is similar in every way to the larger Mazda "C" lamps except that it has a tipless bulb of milk-white glass. The bulb is 2½ in. in diameter and 5⅛ in. long overall. Thus, it is mechanically interchangeable with the 40, 50 and 60-watt lamps. It is made for the 110 to 125-volt range. The diffusing glass of the bulb is of sufficient density to conceal the outline of the filament when viewed from all ordinary distances, yet the light absorption is so low that it gives slightly more light than the clear 50-watt "B" lamp. The glass surface is smooth so that dust collection and cleaning are minimized.

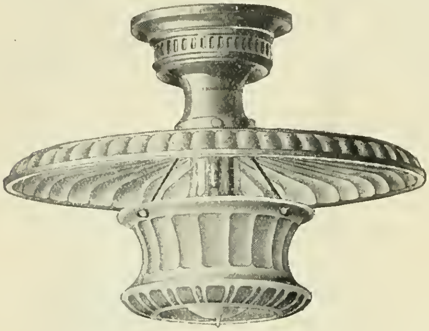


Note absence of tip

This lamp is particularly adapted to be used where the lamps are exposed or where the glassware does not furnish adequate diffusion. It is also said to be advantageously used with indirect and semi-indirect fixtures, minimizing chain shadows and a sharp cut-off of light and to eliminate objectionable glare from portables and domes, where it is difficult to conceal the lamps; it also reduces the glare reflected by glossy surfaces, such as table tops.

The New E-lite Lighting Fixture

A new fixture called the E-lite has been produced by the Luminous Unit Co., St. Louis, Missouri. This unit, in the opinion of the company, is destined to become most popular for home, school and other such places. The fixture consists of a metal canopy, a white glass reflector 13 in. in diameter, and a white glass or Adam embossed etched cylinder of 6 in. diameter. Contrary to the usual design of such fixtures the lamp is encircled by the cylindrical shade but is exposed at the bottom, thus providing a certain amount of direct illumination. This feature also prevents dust from collecting in the shade and makes it easier to clean.


The E-lite

It is claimed for this unit that it is aesthetic, utilarian and attractive—yet economical. It produces a soft tonal illumination and obtains maximum results from the Mazda type C bulb which is used, and its reflector, working in conjunction with the bowl, produces an excellent ray distribution and eliminates shadows. It is furnished in both ceiling and chain design in three sizes for use with 75, 100 or 150 watt lamps.

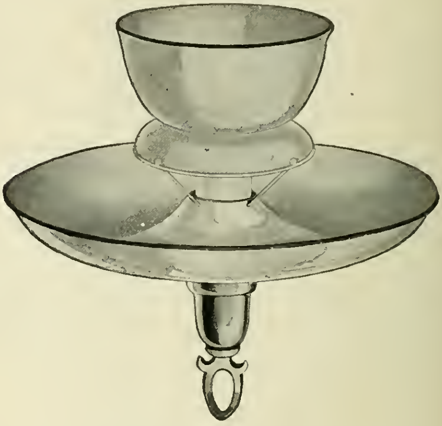
Transplanted Sunlight

"Transplanted Sunlight" is the name given to a new unit recently placed on the market by the Americolite Company, of New York. This Americolite unit, illustrated herewith, is available for both indirect and semi-indirect lighting and is not dependent upon a specially painted ceiling for diffusion. The reflector, it is claimed, is scientifically curved with reference to the space to be illuminated and types are made suitable for any interior and for ceilings of any height. The disc reflector is very efficient—more so than any ceiling—yet it produces no glare. This unit uses nitrogen lamps and combinations of bowl and reflector are available for all lamp sizes. The unit is designed to be placed high up against the ceiling, which makes it specially suitable for store lighting.

An Americolite unit

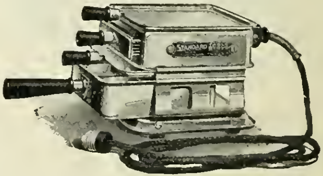
The "Amco" Fixtures

The Art Metal Manufacturing Company, of Cleveland, are entering the Canadian market with their "Amco" industrial, commercial and residential lighting fixtures. The design illustrated herewith is an economical unit for factory lighting. It is really two units in one, combining, it is claimed, the advantages of both the diffusing dome and concentrating deep bowl types of reflector without any of the disadvantages of either. Another unit now being introduced into Canada by this Company is the Amco Illuminet. This is a unit in which the lower half of the lamp bulb forms part of the fixture. The glass globe is made with an open bottom large enough to allow the large portion of the lamp bulb, which is frosted, to fit into it securely. A feature of the Illuminet is that it can be very readily adapted to any new or old lighting fixture in a moment. No wiring is necessary; it just snaps over any standard lighting socket. The distribution of Amco lighting units will be in charge of Mr. Frank T. Groome.


Two units in one

The Standard Stamping Company

The Standard Stamping Company, Huntington, W. Va., manufacture the useful litle table stove, illustrated herewith. This stove includes three distinct cook operations at the same time, such as for example, frying beefsteak, toast and frying potatoes. This is accomplished by the use of two elements burning simultaneously. The toasting operation is carried on between the frying of the beefsteak and the potatoes, which means that the toast is browned on both sides at once. For light housekeeping this type of appliance appears to have a very promising future.


Performs three operations

A New Westinghouse Radiator

The Canadian Westinghouse Company are distributing this Cozy Glow radiator which they have designed to meet the demand for a heater which will distribute warmth in any direction. Just as the electric fan distributes cooling breezes about the room wherever desired, so the Cozy Glow throws its welcome warmth. For use in the nursery, and bathroom on chilly mornings; for ticket booths, train cabs, waiting rooms, etc., in addition to general use throughout offices and homes, this radiator is particularly adaptable.

The Cozy Glow

"National" Electric Heating Devices

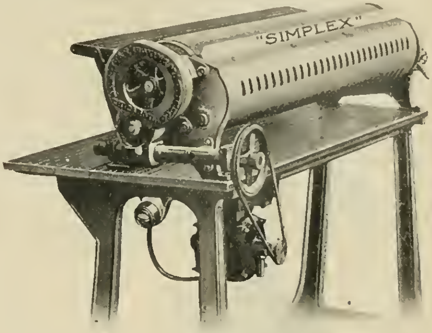
The National Electric Heating Company, Toronto, are greatly increasing the output of their new "Heatray" and also of their new Toaster Stove. The "Heatray" appliance is shown herewith. It is different in many respects from others on the market, particularly with reference to the cone-shaped heating element which is claimed distributes the heat more economically and improves the appearance. This type of heater is certainly a most attractive and useful appliance for any room in any home.

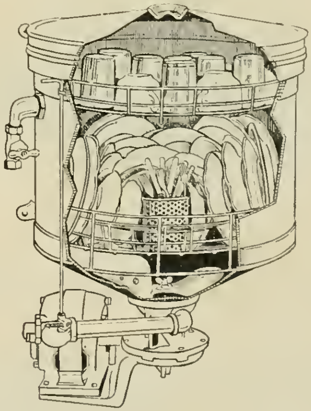
The "Heatray"

One of the most useful Polar Cub appliances is the Fountain Mixer. It is made in two designs, for either portable or stationary use. The model shown is the portable mixer. The Polar Cub appliances are distributed by the A. C. Gilbert-Menzies Company, Toronto.

A Household Size Ironing Machine

The Electric Shop, 72 Victoria Street, Toronto, Mr. Geo. J. Beattie, proprietor, is now selling a household ironing machine of Simplex manufacture. This equipment is illustrated herewith. It is claimed that more than 90 per cent. of the clothes can be done with this machine—everything but actual ruffles. Mr. Beattie is also selling the Walker dishwashing machine, illustrated. The idea in using this machine is that instead of washing the dishes three times a day, you simply scrape them after breakfast and lunch and stack them in the washer. Then after dinner you pour in water, turn on the motor and everything is washed in a few minutes. After repeating the operation with rinsing water you raise the rack and the dishes dry out ready for putting away. The hot water is dashed up through the dishes and then down again and is claimed to wash perfectly.



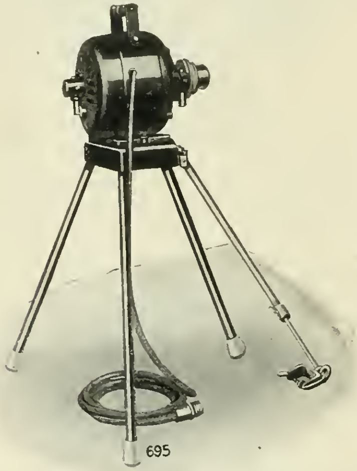


The Premier Incandescent Lamp Works, Inc., Union Hill, N. J., announce that they are moving on October 1 to their new plant at 222 Washington Street, Hoboken, N. J., where they will occupy about five times as much floor space as they have had. This company is not quite a year old and has already outgrown 3,500 square feet of floor space. In their new building they will be equipped to make at least 15,000 miniature lamps per day as well as 3,000 standard nitrogen lamps.

Portable Motor for Driving Farm Appliances and Other Small Machines

There are many light machines used about the farm and country home which can be equipped for electric motor drive by substituting a pulley for the hand crank. The washing machine, churn, cream separator, grindstone, forge blower, ice cream freezer, fanning mill and many other devices are adaptable for such operation. In order that it may not be necessary to have a separate motor for each drive, the portable power stand motor shown in the accompanying illustration has been developed by the Robbins & Myers Company, Springfield, Ohio.

For service in connection with low-voltage private farm lighting plants, the outfit consists of a 32-volt, ¼ h.p. motor, equipped with a back gear which reduces the motor speed of 1150 r.p.m. to a speed of 285 r.p.m. at the pulley. This speed reduction is provided so that it will not be necessary to use pulleys of excessively large diameters on the machines to be driven. A three-step pulley is supplied which consists of V-groove pulleys of 4-in. and 3 5/16-in. diameters for 5/16-in. round belts and a crown pulley of 2½-in. diameter and 2-in. face for a flat belt.



Portable motor for general use on farms

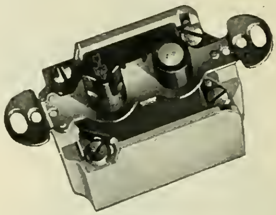
The motor is mounted on a substantial iron tripod base with rubber caps on the feet to prevent slipping. A brace rod with a clamp attachment to the machine to be driven is provided to keep the belt tight. The rod is telescopic for adjustment of length and also has a swivel adjustment so that the clamp can be turned at any angle. The motor is attached to the tripod by two bolts and when wanted for service without the tripod it can be detached easily by removing these bolts. The motor is furnished with a cord and plug for connection to any lamp socket and is provided with a handle for carrying the outfit.

In addition to the 32-volt direct current outfit for operation on farm lighting plant circuits, the outfit can be supplied with a 110-volt, 60-cycle, single-phase motor for operation on central station circuits.

The Roller-Smith Company, New York, are distributing two new bulletins describing, with illustrations, "Columbia Induction Watt-Hour Meters, for alternating current, switchboard type" and "Electrical Instruments for Signal System Testing, S. S. Type."

An Adjustable Push Button Switch

The adjustable electrolier push button switch now being featured by the Arrow Electric Company, Hartford, Conn., is different from previous types of electrolier switches in that the switch does not have to go through the entire cycle of circuits every time it is operated. This switch, to all effects, is nothing more than a single pole button switch. The black button, however, has a double function, for it not only does its regular work in putting the lights out whenever pushed, but also turns to four rotary positions as desired. By means of the black button, the switch can be adjusted or set on any one of four possible combinations of lights, for example, circuit one, or circuit two, or circuit three, or circuits one, and two and three, and operate on that particular circuit by the push buttons as long as desired without bringing in the other circuits. This switch is made in either two or three circuit combinations, and in effect is exactly equivalent to two or three single pole switches, for it permits the lighting of the circuit separately or together as desired. It takes the standard switch plates and boxes and does away with the necessity for gang plates. It allows individual or group control of lights from one point and it saves the necessity of individual switches on each fixture.



Performs a double function

Many Uses of Aluminium

The meter case illustrated herewith is of pressed aluminium, manufactured by the British Aluminium Company, 25 Adelaide Street West, Toronto. This company supplies large quantities of aluminium sheet for lamp reflectors, meter cases and, in connection with domestic appliances, sheet for kitchen table tops, cabinets, etc. We understand that aluminium lamp reflectors are very popular in the Old Country where they are made with a polished outside and a frosted interior which gives a pleasant diffused light. They are very economical to spin and are easily kept clean.

An aluminium meter case

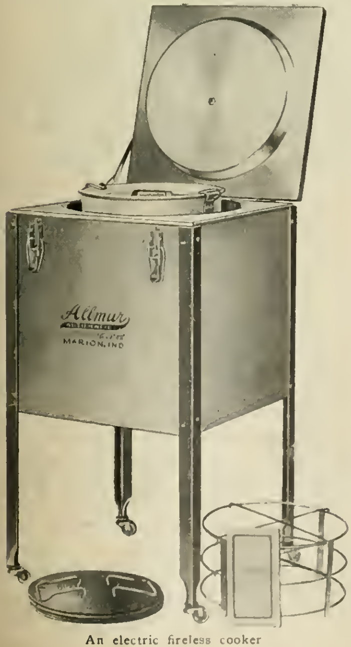
Presto Push and Pull Type Switches

We are showing herewith the very latest Presto product, a push and pull type switch. These switches are made in four different combinations, either single, double, triple or quadruple styles. The switch body parts and plate are made of steel, and all the switch parts are thoroughly insulated. These materials will resist intense heat, and also may be subjected to rough usage. An advantage claimed for this switch is that the holes for the screws in the top plate are farther from the centre than other switches, and the screws will not break away from the wood, because they are not on the ragged edge. All Presto switches are provided with screw terminals and connection bars for the gang switches. The standard finish is black plate with nickel-plated knob; each switch being packed in an individual carton, handy for display and sale.

Made in four different combinations

The Allmur Automatic

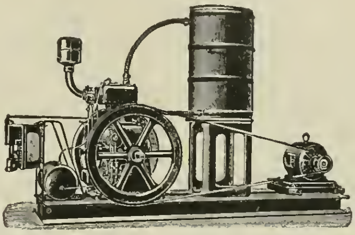
The Allmur Automatic Electric Cook Stove is a combination of the fireless cooker and the electric range. For economical operation this is one of the most satisfactory types of stove on the market. The address of the Allmur Manufacturing Company is Marion, Ind.



An electric fireless cooker

For Farm Light and Power

For home and farm lighting and, indeed, for power and illumination requirements at any point where a supply of electric energy is not available from a larger central station, the Lister-Bruston automatic plant has shown itself efficient and entirely satisfactory in operation. Plants are made by this company in various size generators, either direct connected to the engine or belt-driven. In the cut shown, the generator is driven by belt. A storage battery also constitutes part of this plant, though not shown in the illustration. The battery is of such a size as to be capable of starting the engine and carrying a proportion of the load without the necessity of using the engine. The automatic features take care of the starting and stopping of the plant, so that a minimum of attendance is required. This plant is handled in Canada by R. A. Lister & Company, Toronto.


One of various sized plants

Silent Driving Chain Operating Generators

A common and successful application of the "Morse" and "Renold" silent driving chains is in the operation of electric generators, powers ranging from 25 to 5,000 h.p.

The illustrations show a 5,000 h.p. "Morse" silent chain drive from two water wheels to a generator at the Ox-Bow hydro-electric plant, Snake River, Copperfield, U.S.A. The drive is divided into two halves, one half from the shaft of each water wheel unit. Each half consists of four chains of two inch pitch by 21 inches wide, carried by sprockets of 71 and 47 teeth, 91 inches face, and 129 inches center to center. The water wheels operate at 147 r.p.m. and the generator at 225 r.p.m.

Illustration No. 1 shows the generator idle and the left half of the chain drive. Illustration No. 2 shows the generator in operation, one-half of the chain drive being seen

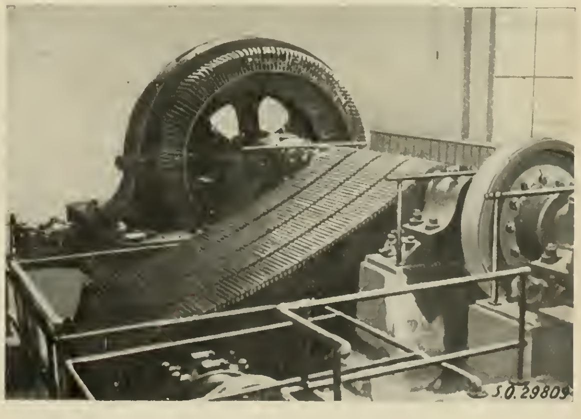


Fig. 1 shows left half of chain drive, generator idle

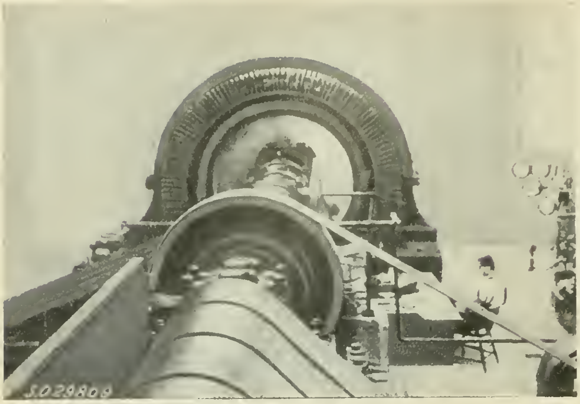


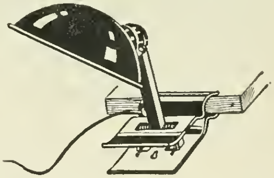
Fig. 2—Showing right half of chain drive, operating

in the immediate foreground and the other half partly visibile to the left of the generator.

This chain drive has been in continuous operation since 1914 without any expense for maintenance. Drives are quiet running, compact, durable and highly efficient. Jones & Glassco, Reg'd., Montreal and Toronto, are Canadian representatives for "Renold" and "Morse" chain, the two largest manufacturers of silent chains in the world.

The Handy Adjusto-Lite

The Adjusto-Lite is one of the handiest things that has appeared on the market for some time. It clamps on anywhere, and, consequently, its uses are legion. It is made in solid brass, three finishes, guaranteed for five years.

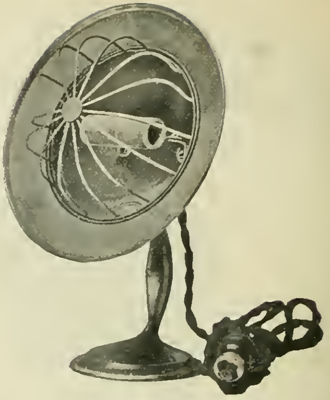


It clamps anywhere—shines in any dirtction

A notable feature about it is that is is universally adjustable, being capable of directing light in any required direction. It is manufactured by S. W. Farber, 141 South Fifth Street, Brooklyn, N. Y.

The Quebec Railway, Light, Heat & Power Co. have ordered ten double truck P.A.Y.E. cars, at a cost of $185,000, which will be in service in October. The operating expenses of the company continue to increase, and as illustration of this, it may be stated wages have risen 46.94 per cent. for the year ending 31st July last, as compared with the same period in 1914.

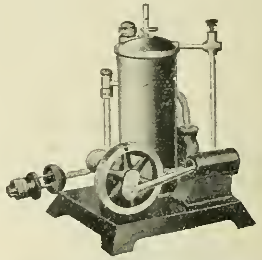
At a recent meeting of the ratepayers of Wiarton, Ont., it was resolved to ask the town council to take steps to cancel the existing contract with the Sauble Falls Light and Power Company and to negotiate with the Hydro Electric Power Commission for a supply of power. The Sauble Falls Company state that there is about $6,000 outstanding in unpaid accounts which has hindered them, financially, in making certain improvements to their plant.



The "Majestic" Heater—A special model handled exclusively by Nerlich & Co., Toronto

Don't Forget the Young Folks

Dealers must not forget the young people in the home. The use of electric toys is safe and sanitary and many more should be sold than are at the present time. D. C. Hughes & Company, Chicago, manufacture an electric toy steam engine with real power and an electric toy range that cooks and bakes. The toy engine is illustrated. For holiday trade there should be no question that these little appliances will find a ready sale.



An electrically operated steam engine

The M. Propp Company, 108 Bowery, New York, have added to their lines this year a volt lifter, lamp tester and electric iron replacement plug, all of which are useful accessories.

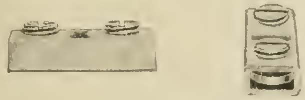
The Adams-Bagnall Electric Company have prepared a new catalog No. 175, as of date July 1, 1919, which supersedes all previous lists. This catalog deals with porcelain enamel steel reflector equipment for efficient and economical industrial lighting. "Abolites" are distributed by R. E. T. Pringle, Limited, Toronto.

An application will be made by the Winnipeg Electrical Railway Company to the Public Utilities Commission for a temporary increase in fares or the elimination of special Sunday rates, workmen's tickets—six for 25c—not to be good on Sundays.

The Bell Telephone Company, Ottawa branch, have opened their new "Sherwood" exchange on Eccles St. About 3900 subscribers were changed over from the "Queen" exchange.

Useful Fixture Connector

A useful fixture connector is sold by the H. D. Sherman Manufacturing Company, Battle Creek, Mich. The screws of this connector, it is claimed, never come out; this saves time and with the price of labor these days time is money. Another feature is that the Sherman connector is made of heavy brass, assuring high conductivity and no rust. These connectors will connect any small wires up to No. 12, with a maximum of two No. 12's solid or three No. 14's in either end.


Screws can't come out

Ferranti Company in New Home

The Ferranti Electric Co. of Canada have erected a new building on the corner of Strickland and Noble Streets, Toronto. The building consists of three storeys, comprising 10,000 square feet of floor space, all of which will be occupied by the company. The front half of the second floor will be used for offices, the balance of the space being devoted to the building and assembling of transformers and meters. These enlarged quarters have given the company the increased facilities necessary to take care of their expanding business. On the adjoining property a temporary storehouse has been built for storing the stock. It is the company's intention next year to build an addition on this property to their present plant, adding probably 20,000 square feet of floor area. Col. George C. Royce, general manager of the company, and Mr. F. W. Rowntree, assistant manager, are very optimistic over business prospects.

The new Ferranti Building

The Great West Electric Company, Limited, Winnipeg, have issued an attractive catalogue, designated Catalogue "G," describing electric fixtures and glassware, with illustrations, and including a section devoted to electrical specialties and labor-saving devices for the home. This company have made special arrangements to take care of the demand for 32-volt appliances and fixtures created by dealers handling small lighting plants. This catalogue is of special interest on this account and will be mailed on request to the Great West Electric Company.

The Macbeth-Evans Glass Company, Limited, Toronto, have published an interesting catalogue, No. 82-A, describing and illustrating their line of Thebian ware.

Returned Soldiers Learn Armature Winding

This illustration shows returned soldiers learning electric arc welding, and armature winding on electric motors. The Vocational Branch of the Department of Soldiers' Civil Re-establishment is giving these returned soldiers, who were either minors at the time of enlistment or have been permanently injured in the war, a training in some particular trade for which they seem to be best fitted, their educational qualifications and pre-war experience being taken into consideration. Experienced electric welders, as well as experienced armature winders, can command high wages and the time spent in training these men ought therefore to be well worth while.

SOLDIERS CIVIL RE-ESTABLISHMENT
DISABLED SOLDIERS RE-TRAINING FOR CIVIL LIFE
LINCOLN ELECTRIC CO
HAVE MADE GOOD
Soldiers at work in Lincoln Electric Exhibit

Magistrate Supports Hydro Inspection Department

On the 23rd inst., before Magistrate Craven, of Stayner, a Toronto wiring contractor was fined $450.00 and costs for violating two of the Commission's wiring inspection regulations. This is the largest and heaviest fine which has been imposed to date for violation of the Commission's rules and shows conclusively that the magistrates of this province fully realize the necessity and advisability of backing up the Commission's Inspection Department in its endeavor to carry out the Rules and Regulations which have been adopted by the Commission for the prevention of fire and accident.

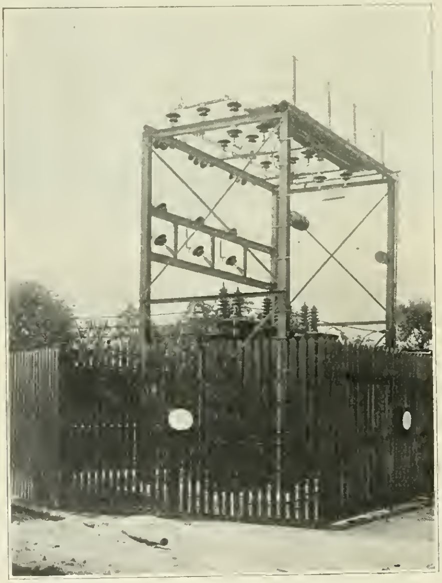
We understand that the contractor in question received plenty of warning and it is obviously part of his business to know that the Commission intends to enforce the Regulations which they have made and which are now the law of this province. There is no doubt that the best of the wiring contracting element in Ontario will commend Magistrate Craven for dealing severely with the matter and will realize that the Commission in enforcing its laws regarding inspection is safeguarding not only the wiring business but the general public. We trust this fine will serve for all time as a warning to itinerant wiremen and others that they had better take out permits in future.

The Harold Electric Repair Company has recently opened premises at 66 John Street, Toronto, for repairing of motors, generators, etc.

Standardizing The Outdoor Substation

By Mr. H. W. Young[*]

While practically every outdoor sub-station is special in that local requirements must be met, yet a very complete standardization of elements has resulted in a substation design which is practically standard for a large percentage of installations. The development of unit type elements such as switches, choke coils, fuse mountings, lightning arresters, bus bar supports and steel tower sections, permits special assemblies to meet actual conditions. For example the switching and protective equipment can by means of adjustable fittings be secured in various positions on the tower, or at different spacings or heights. The supporting tower is made in sections which can be erected to secure sufficient ground space for transformers of different capacities or dimensions. The bus bar supports can be clamped as desired on the steel frame, thus securing the most advantageous spacing or clerances of bus wires. This flexibility in arrangement of standard unit type elements is of great convenience to the transmission company as it eliminates the expense of delay always incident to securing a special equipment.



Unit Type, 450 kv.a., 33000 Volt, Outdoor Sub-station

The installation shown is a typical example of unit type elements assembled to meet a special condition. In this case the purchaser wished to have the lightning arrester mounted near ground level rather than on the tower. This condition was easy to meet by using separately mounted arresters, locating them on a 1-1/4" pipe frame. To enable isolating these arresters for complete adjustment or inspection, three standard disconnecting switches were bolted to channels fastened to the tower corner poles. The transformer bus wires were suspended between standard dead end insulators of the same type used for attaching incoming line wires to the steel tower. The three pole air break switch is of interlocked type with operating handle at ground level, thus permitting all three poles of the switch to be simultaneously opened and closed.

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[*] President, Delta-Star Electric Company.

Current News and Notes

Brighton, Ont.

The farmers in Brighton township are desirous of securing Hydro power and have instructed the clerk to ask the Commission for plans and estimates.

Chatham, Ont.

It is reported that the city of Chatham, Ont., will take over the electrical business of the Chatham Gas Company.

The Bell Telephone Company have taken out a permit for a new office and exchange building on Sixth Street, to be opened some time during the coming summer.

Kitchener, Ont.

The special committee of the City Council and Light Commission, appointed to confer with President W. H.Breithaupt, of the Waterloo-Wellington Railway, has decided to recommend that no action be taken on the offer of the company to lease their Bridgeport line to the city for 12 per cent. of the gross receipts. The committee, however, will recommend that the railway be purchased by the city provided a satisfactory price, based on the earning power of the road, can be agreed upon.

Montreal, Que.

The Minemax Electric & Manufacturing Company, Montreal, (T. W. F. Cleaver and P. Marazza), have registered.

Peterboro, Ont.

Mr. P. Alexander has retired from the firm of Alexander and Miller, electrical contractors, Peterboro, Ont. Mr. J. H. Miller, who has been a partner for eighteen years, will continue in association with Mr. G. R. Powell and Mr. G. H. Watson, who have been connected with the firm for a number of years. The store will be known in future as "The Electric Shop" and the firm name will be Miller, Powell and Watson.

St. Stephen, N. B.

The New Brunswick Public Utilities Commission, in joint meeting with the Public Utilities Commission of Maine, recently granted the street railway company, operating in St. Stephen and Calais, permission to use the seven-cent fare and the right to issue books of eight tickets for fifty cents.

Swan River, Man.

The municipal board of Swan River, Man., will shortly call tenders for an electric power and light plant.

Toronto, Ont.

Employees on the Toronto Civic Railways have been granted an increase in wages and now receive the same rate as that paid by the Toronto Railway Company.

The Toronto Hydro-Electric System will proceed with the installation of an electric lighting system in the Woodbine Heights district in the township of York.

Plans have been prepared for an extension of the Toronto Civic Car lines from the corner of St. Clair and Yonge Streets to the city limits via the Mount Pleasant Road. The cost of the line is estimated at slightly under a million dollars.

Uxbridge, Ont.

The town of Uxbridge now enjoys the distinction of having the highest domestic lighting rate on the continent. The charge was originally 10 cents per kw.h. with discount. Some months ago the plant was taken over by the municipality and the rates are now 20 cents per kw.h. plus meter rental and no discount.

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Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

WANTED — TECHNICALLY TRAINED MAN with view to taking up designing of electrical apparatus, principally A.C. motors. An opportunity for the right party. Box No. 27, Electrical News, Toronto. 19-22

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16-21

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Giving a Taste of Electric Service

The Indiana Power & Water Company, at Vincennes, Indiana, is using a novel scheme to overcome the lethargy of owners of homes not now wired for electricity. Where the cost of complete wiring of an old house for electric lights appears too excessive to the owner, the Power Company offers to install what they call their "service board," on which are mounted a key socket and lamp, a rosette with ten feet of drop cord, and a flush receptacle into which may be plugged an iron or similar heating device. The board is furnished complete with meter and an electric iron for $7.45

The advantage of this scheme is the low cost at which some of the immediate advantages of electric power can be obtained, and the elimination of the confusion which sometimes goes along with the wiring of an old house. Once one of these service boards is installed, say in the kitchen of the house, it becomes a silent salesman for the electrical idea, and is therefore an entering wedge to a complete wiring of the house. Further than this, in the case of rented houses, where the owner will not put in wiring but the renter desires it, the latter gets the advantages of the electric power, and can take his service board with him when he moves, with the assurance that the Power Company will serve him at his new location.—"Contact."

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1	30	3	25	550	1500	T. & H.
1	30	3	25	550	720	Westg.
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1	25	3	25	550	1440	J. & M.
1	25	2	60	220	945	Westg.
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2	15	3	25	550	1400	Lancashire
2	15	3	25	550	730	Westg.
1	12	3	25	550	720	Lancashire
2	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	J. & M.
1	7½	3	25	550	1500	Lang-Dav.
1	7½	3	25	550	750	C. G. E.
1	5	3	25	550	1440	Excelsior
1	5	3	25	550	750	C. G. E.
2	4	3	25	550	1400	Excelsior
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Ignorance and Prejudice a Poor Combination

A member of the Board which is making investigations into the present cost of various manufactured products, during the cross examination of a well known Toronto jobber, is reported to have remarked that he had always looked upon the jobber as an unnecessary factor in business. What bearing this remark had on the question at issue was not evident but it indicated, nevertheless, an entirely inadequate knowledge of the various steps in merchandising. Without such knowledge the present investigation is doomed to failure. Where ignorance and prejudice are found in the same judge, however, the situation loses interest even for the public.

We hold no brief for the jobber any more than for any other link in our industrial life. He exists today, we imagine, for the same reason that manufacturers and retailers exist—to supply a demand. There are three distinct links in the chain—(1) the manufacturer makes the equipment, (2) the jobber or the wholesaler takes it off his hands and distributes it to the retailer and, (3) the retailer passes it out to the consumer. A manufacturer may also perform the function of a jobber, but that does not alter the fact of the jobber's existence. The commissioner seemed to have a sort of hazy idea that the jobber's profit was an "extra." Did he ever stop to ask himself why the average manufacturer doesn't do his own jobbing and keep this extra profit himself? If he had the logical answer must have suggested itself to him at once—the jobber can perform this function of distributor cheaper than the manufacturer can. Why? Because he specializes on distribution.

This Board seems to forget that the country is watching the action of its members pretty closely. Stupidity and prejudice will make them no friends. The public have a shrewd idea just about where and to what extent profiteering has been carried on—all they lack are the facts and it was to gather facts this Board was appointed. Personal opinions, under such circumstances, are better suppressed.

Unfair Attitude of Public

One of the curiosities of the interminable controversies over the higher cost of living and the universal rise in all commodities has been the attitude of many public bodies to the demands of public utility companies for increased revenue. While it cannot be denied that the cost of operating and maintaining street railways, for instance, has risen—yet the request for more revenue to meet these conditions has been met with vigorous protests, and at the same time the companies have been denounced in vitrolic terms if the service is curtailed or is not maintained up to the accustomed standard. A notable example of this inconsistent attitude has occurred in Montreal, where owing to higher wages the Tramways Commission has been compelled to issue a higher schedule of fares. The claims of the men were of course supported by the labor organizations, but when these claims compelled additions to the fares, the Commission was fiercely attacked by a labor organization for adopting the only method by which the increased wages can be paid. It was declared to be an injustice to the working classes, who, according to this argument, want low fares and high wages. That way spells bankruptcy.

The city of Montreal appealed to the Quebec Utility Commission against the proposed fare increases, and called in Mr. James R. Bibbins, assistant chief engineer of B. J. Arnold & Co., Chicago, who, instead of supporting the case for the city, expressed the opinion that there is no justification for reducing the estimates of the Commission for this year, and no chance of lowering the fares fixed by that body. The time was too restricted for a thorough examination of the system, but he made some suggestions which he believes will ultimately result in more economical operation. For instance, he is of opinion that there should be efforts made to standardize power plant and equipment, which will take time, and also to eliminate many stops. He emphasized the fact that rush hour service is the most expensive, giving a number of reasons, chiefly because of continuous fixed charges on equipment used only at certain times. The cost of power to deal with this rush traffic is also necessarily high. An important fact in relation to the cost of maintenance and renewals was also brought out. While the quantity of work done in 1918 was only about 80 per cent. of work done in 1913, the cost was over 120 per cent. higher than in 1913, due to increased costs. Mr. Bibbin favored free transfers and opposed the zone system.

The position taken by the company is that the budget is not sufficient, and that an average fare of 6.6 cents should be allowed instead of 5.9 cents suggested by the Tramways Commission. The result of adhering to the Commission's estimates will be a deficit of a million dollars, in addition to the $1,300,000 already incurred, and unless still higher fares are granted a larger deficit will occur every succeeding year. The company is not interested in the distribution of the burden of additional income, but in securing sufficient revenue to meet all obligations.

The Montreal Tramways Co. admittedly give one of the best services on the Continent, and if they are denied an adequate income, owing to low fares, will not be able to maintain an efficient service, and the public will thus suffer.

An Engineer's Opinion of Ottawa Conference

At the luncheon of The Electrical Club of Toronto on Friday, Oct. 3, Mr. Frank R. Ewart, of the firm of Ewart and Jacob, consulting electrical engineers, gave an interesting address, summing up his impressions of the National Industrial Conference recently held at Ottawa. Mr. Ewart was chosen by the Toronto Section of the American Institute of Electrical Engineers to represent the viewpoint of the technical electrical man at the Conference, as one of the "third" or neutral group. In this third group were a number of engineers.

At the outset, Mr. Ewart said, it became evident to him that the Conference was more or less in the nature of a contest, but the antagonistic attitude seemed to disappear about the end of the third day and thereafter there was a feeling of greater openess and friendliness. Labor was out for legislation; it was their apparent belief that the cure for all the ills of this country was legislation ad lib., while it seemed to the speaker that if the labor men could have got eighty representative employers to whole-heartedly agree with them in the matter of wages and industrial relations, there would be no need for legislation. The original attitude of the employers appeared to be very much "stand-pat," their chief argument being "This is not the time." This argument, however, was silenced by a labor man who pointed out that the employers had used it on every occasion when a progressive suggestion was brought forward.

The main points of contention were the eight-hour day, collective bargaining and recognition of unions, and on these questions no agreement was reached. In the matter of joint councils, the employers and the employees got closer to an agreement, though they favored different types of councils. The labor leaders wanted the Whitley plan, which is based on recognition of the unions.

An outstanding feature of the conference was the relative debating methods and skill of the two parties. The labor delegates all had something to say and advanced arguments on behalf of their proposals which were certainly definite and clear-cut and well-expressed, while the employers' efforts, outside of a few excellent speeches on the part of some of the leaders, showed up poorly by comparison.

M. Ewart pointed out that commissions, boards and bureaus had been recommended to deal with many questions brought up at the conference, but its real value would be the effect it might have on the minds of some 200 delegates and the impression they received of the other fellow.

Courtesy—No Investment Required, Returns Are Amazing

Men,—hundreds of them, yes thousands have longed for an opportunity to "show",—for the chance to get somewhere in the game of salesmanship. They finally get the chance, the opportunity. They are drilled by their managers,—lectured at meetings, collectively and individually. Then how do they measure up? Not all, but a large per cent., something like the following:

Late one night on a train leaving for the South, I chanced to make the acquaintance of a gentleman from my home city. During our conversation he inquired as to what business I was interested in. This information I gave him, whereupon he casually went on to say that his wife had had a vacuum cleaner out at his home on trial only about two weeks before.

He went on to say what a wonderful device an elecric cleaner is and how thoroughly he was sold on such devices for lightening the work of his wife around the home. During our talk on the subject he informed me that had the salesman been just half civil and shown the least amount of courtesy to his wife that she would have purchased the cleaner from him. As a result, of his lack of judgment, she ordered him out of the house.

The cleaner was sent back,—not because the work it accomplished was unsatisfactory, not because the price was too high,—not because she was a "joy rider" as some salesmen are wont to term some prospects, but because the salesman forgot that he was doing the selling—not the buying. Lack of courtesy and his willingness to quarrel lost him that sale. His lack of commonsense lost him his commission and the office the profit on the sale. And more, he made an enemy of a woman who really wanted to purchase a cleaner. What her comments will be to her friends, we can just imagine, but we are dead sure they won't be favorable.

I inquired of my new acquaintance as to the make of the cleaner he had tried. When he told me that it had been the machine manufactured by my own firm, my estimation of the salesmen dropped a good fifty per cent. I apologized for the salesman and explained the best I could what we were up against in the way of salesmen.

Immediately upon arrival at the Branch Office in the morning I looked back over the records of demonstrations and learned the salesman's name who had been out on that prospect. Sure enough, the demonstration card had been marked, "J. R.-ng," meaning, joy rider, no good.

The point is, that the salesman who had made this particular demonstration was a man who we've spent many hours with,—one who we've tried to take more than a passing interest in,—one who has had the opportunity to sit in on sales meetings and gather valuable information and instruction. In fact, he is better than the average as far as the closing of sales is concerned, but his fatal error, his mistake is, his willingness to "fight" prospective customers. Courtesy doesn't mean any more to him than milk does to a fish. It is his own undoing,—it will forever keep him back, and he, like a great many other salesmen, will wake up and realize some day when it is too late, when opportunity has slipped by, that more flies are caught by molasses than by vinegar.

To be courteous, pleasing, accommodating, costs a salesman nothing. The average woman expects courtesy. She confers the favor in purchasing, not the salesman or the person he sells.

More sales are lost by retail salesmen because of their snippiness, their willingness to "fight" prospective purchasers, and their lack of courteousness than because of any lack of knowledge of the article they are selling.

All the sales meetings that can be held, all the books on salesmanship that have or can be written are as worthless as glasses on a blind man, if the one attribute, courtesy, is pushed to the back ground by snippiness and sarcasm.

Courtesy,—it gets the salesman the orders and costs him nothing. Be a dispenser of it and in many a tight pinch it'll "bring home the bacon" when the technical points are like so much water on a duck's back.—From Eureka "Volume and Velocity."

Inspected Shawinigan Properties

A party of members of the Senate, at the invitation of Senator Smeaton White, on October 4 visited Shawinigan and Grand'Mere, P. Q., and inspected the plants of the Shawinigan Water & Power & Allied Companies. Members of the party spoke in terms of high appreciation of the development in generating power and in the electro-chemical industries. The object of the visit was to demonstrate the enormous progress which has been made in power development as related to industries and also to make members of the Senate better acquainted with the growth in the pulp and paper industries.

The Viewpoint of "The Man on the Street"

Public Utilities are at all Times on Trial Before the Court of Public Opinion. A Splendid Address Before the N. E. L. Association

By S. M. Kennedy*

If there is any class of business which is at all times on trial before the great court of public opinion it is that of the Public Utility Corporation. The establishments of the merchant, the manufacturer and other industries are operated from eight to ten hours daily—on the working days only—but the central station company must be ready to supply instant service day and night, week-days and Sundays, feast days and fast days, high days and holidays. The jury is in constant session taking cognizance of the evidence which is being given, and be the testimony good or bad, honest or dishonest, worthy or unworthy, no item is overlooked when the times arrives to review, sum up and render a verdict. The utility company cannot select its jurors as they are selected by the opposing attorneys in a trial in court. Its jurors are selected by the destiny that groups men together in cities and communities. These jurors may not be challenged, but must be accepted with all the bias or prejudice they may bring to the trial. Consequently it may be the part of wisdom for the heads of public utility organizations to study the jurors—to analyze and diagnose any causes for suspicion, prejudice and opposition to the end that the evidence may be so influenced and directed by liberal policies and enlightened management that the verdict may be a source of every day satisfaction. Certain conditions surrounding the operation of a public utility's business are fixed and cannot be altered, and such being the case, operation should be so adjusted that these conditions may be recognized, and, if possible, used to advantage. It is as advisable for a corporation to be philosophical when dealing with the inevitable, as it is for individual—both may well agree with James Whitcomb Riley:

"It ain't no use to grumble and complain,
  It's just as cheap and easy to rejoice;
When God sorts out the weather and sends rain,
  Why—rain's my choice!"

It is probably safe to say that three-fourths of the mistakes that the Central Station man makes in his intercourse with the public are made because he does not really know the things he thinks he knows. If the Central Station is constantly on trial, had it not better keep its eye on the juror and if possible get his viewpoint There was a time when it was thought the juror could be ignored—that he had to take what was given him and be quiet—but now things are different. A Russian proverb says: "Time does not bow to you, you must bow to time." Today it is perhaps better to bow alike to time and the juror and take them both into consideration. The juror can only be fixed by some one obtaining his viewpoint—that is, by the corporation man looking at the business from the outside, or as it is seen by the Man in the Street.

The Man in the Street is a many sided individual in some respects, but in the main he will be found reasonable, tractable and not unfriendly. In my efforts to illustrate the different angles of observation from which the Man in the Street looks inward at your business, I will endeavor to develop five sides of his character. It will be distinctly understood that I am not advising anyone how to change or conduct his business. Long ago I learned it is permissible to express an opinion—but advice should be sent by slow freight. The Man in the Street has some advantages not possessed by the man inside, and the man on the inside can well afford to listen if the man on the outside has anything to say. The five angles from which the Man in the Street will here be considered are (1) The Impressionist, (2) The Student, (3) The Human Being, (4) The Customer and (5) The Investor.

The Impressionist.

It has been truly said that trifles make perfection, but perfection is no trifle. As an impressionist, the Man in the Street is either consciously or subconsciously influenced by what appear to be trifles. Daily as he proceeds on his way he observes the properties and employees of the Central Station. Do they impress him favorably or do they irritate him? What pleases him and why? When is he jarred and for what reason? As he looks along the principal streets in his town do the pole lines impress him as being clean-cut and regular? Are the poles located in the least objectionable places and are the services run with any regard to appearance? Sometimes he sees lines that appeal even to a layman as being carefully planned and excellently constructed. Sometimes he observes that a street or highway is needlessly disfigured by irregular poles, ragged wires and sloppy construction. Don't imagine these conditions are not observed by the Man in the Street. They speak for themselves and later on, if they are not remedied or made less objectionable, the Man in the Street is liable to make a noise which will sound to the Central Station like having to spend a lot of money for removal of such lines or maybe the installation of underground construction in their place. How about the stations, sub-stations, warehouses and garages? Do they always present a creditable appearance? Could the grounds around them be kept more tidy and would some needed repairs or a coat of paint on some buildings make a better impression? The Man in the Street misses nothing. He knows whether you are properly maintaining your property or allowing it to degenerate. If objectionable conditions continue without improvement, he may charitably conclude you are in a rut, and he knows that the only difference between a rut and the grave is in its dimensions.

The Man in the Street has business in your office occasionally. Is it an up-to-date office, with an open, inviting appearance, or is it one of the old, forbidding type, with high railings, with little windows for the clerks to look through at customers and the customers must stand off and meekly take whatever may be handed them A pleasant, cheerful office is an invitation to come again, and no one realizes it more than the Man in the Street. Are the clerks neatly dressed—the men with clean clothes and clean-shaven faces, and the women in such costumes and colors as befit their work Is the Manager easily accessible or is he locked in behind a closed door where he cannot see his assistants and where the company's customers cannot see him? High railings, dark partitions and closed doors impress the Man in the Street as belonging to ways that are dark and secrets that are deep. Open offices invite him to inspect and he is liable to say to himself that an invitation to inspect implies that there is nothing to conceal.

I have heard some men say, "What does it matter to the Man in the Street how we maintain our property? We get no more revenue from him if our lines are straight or crooked, our buildings and property tidy or dirty and our offices inviting or the reverse! He gets the service just the same." There is the great mistake. You are part of the community in which he lives and takes a pride. Your methods either help the community or hurt it. If your methods please him, he will ultimately take more liberally of your service, and your income will be correspondingly greater. The impressionist side of the Man in the Street is one that should be regarded as highly important and not to be slightingly ignored or carelessly overlooked.

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*General Agent Southern California Edison Company.

The Student.

The one thing that is most frequently overlooked in connection with the Central Station business is that the company is distributing an intangible commodity. The purchaser does not see what he is buying, as is the case with ordinary merchandise. He cannot tell when he pays his bills that he is paying only for what he has received. His senses, which are useful in buying some things, do not help him in his purchases of electricity. Under conditions like these, something must be relied upon to take the place of the senses and the only substitute is confidence. Now the average Man in the Street wants to know just where he is at when spending his money, and the Central Station Company should make it easy for him to learn all that is possible concerning the real facts surrounding the production and distribution of electricity. The Man in the Street will study conditions and reach his own conclusions about your business. If the truth is spread before him for thoughtful inspection, his conclusions are liable to be favorable. If, however, he becomes saturated with mis-information concerning the methods and aims of the Central Station, then his ideas will be perverted and his attitude prejudiced. The Man in the Street is reasonable and willing that a company giving good service should receive a fair return on its investment. However, in a reasonable manner he must be shown what is the investment and what constitutes a fair return thereon.

Perhaps there is nothing more important for the Man in the Street to study than the subject of what is good service and how it may be obtained. If he is a lighting consumer he ought to be informed as to the difference between ordinary light and scientific illumination. He should be advised that he may often have better lighting at less cost, by using more modern methods. If he is a power consumer his installation should be inspected and where conditions indicate wasteful consumption, the way should be pointed toward more economical operation. He should be instructed that when he has troubles with his service he should tell them to the company and not to his neighbor. He should know what department of the company to communicate with and what is the telephone number.

Does the Man in the Street know that all rates for service are subject to approval by the State Public Utility Commission? Does he know that these rates are ordered or approved only after exhaustive investigations made by the Commission's experts as to the company's actual investment, operating expenses, and depreciation charges, and are calculated to yield only a small return on the capital invested Does he know that the Central Station Company cannot raise a rate or increase a charge without an order from the utility commission after a public hearing has been held? Does he know that in fixing rates the utility commission does not consider the company's bonded indebtedness or outstanding capital stock as a basis for calculating what should be the company's net earnings? Does he know that the Central Station Company cannot issue any securities without the approval of the utility commission, and that the company must show how every dollar derived from the sale of securities is to be spent? Does he know that the return the company is allowed to earn on its investment is not sufficient to provide for extensions and betterments, and that for such purposes new money must come from the sale of the company's securities to investors? Does the Man in the Street know that if he has a grievance against the company he may make a complaint to the utility commission, and his trouble will be thoroughly investigated? These are matters for the Man in the Street to study. At times they mystify and bother him, but the more he learns regarding public regulation, the more he is liable to esteem the utility commission, respect the company and be satisfied that his individual interests are fully protected. With a proper understanding of public regulation the Man in the Street has a better grasp of the economic law of natural monopoly. As a student, he may well consider some chapters from the records of disaster that are written in the history of many cities and towns in America where rival utility companies have attempted to operate in the same field, where that field is properly served by one company at reasonable rates. His study will develop that unfair competitive conditions are ultimately disadvantageous to the consumer, who by increased rates must inevitably pay for the destruction caused by unnecessary competition. All publicity of misinformation should be counteracted by even greater publicity of true conditions. Truth is mighty and if the Man in the Street may study and grasp its meaning he will eventually become a defender of the Central Station and an ardent advocate of its service.

The Human Being.

Quite recently the manager of one of the districts operated by a large utlity company in this state received a letter from a consumer reading as follows:

"Ordinarily when we pay an account promptly, we feel we have fulfilled our obligation, but in your cases we are moved to something more, and the purpose of this letter is to thank you for the businesslike manner in which our transactions with your company have been handled. Furthermore, we have enjoyed that indefinite 'something' which goes with your service, and which makes it a pleasure to do business with you."

The Man in the Street is a human being and that indefinable "something" referred to is a recognition of the tactful, attentive courtesy displayed to him as an individual. This attribute attracts new consumers, and makes the older ones feel at ease and satisfied. It is, in fact, the open sesame to the public good will, without which no company can continue to be successfully operated. The rulings and orders of utility commissions may govern the quality, manufacture and distribution of a commodity, but they do not stipulate what shall be the attitude to the individual consumer. That is left to the management.

The Man in the Street dislikes to be herded—he hates to be known as one of so many thousand consumers a company may have in a community. He likes to be considered as an individual, and if he is known by his name, he likes it better still.

From my own residence I have occasion to send quite a few long distance messages over the telephone. There are two Long Distance Companies, and heretofore I have always been prejudiced in favor of the older company. When I ask for Long Distance, the routine is, "Number, please? Your own number? Your name?" Recently, at certain hours of the day, a new operator is on my line at the office of the other company. I have never seen her and do not know her name. When she says, "Number, please?" I may say, "10621." When she says, "Your own number," I say, "571-W," and then instead of saying "Name, please?" she says, "Oh, yes, Mr. Kennedy." Now, I am the Man in the Street. I like my individuality recognized, and because of that girl's tact, my business seems to be gravitating to her company.

Much of the criticism directed against Utility Companies might be dispelled or relieved by a broad-minded policy in handling complaints, in which each case is treated as an opportunity for acquaintanceship with the consumer and each complaint is given an individuality, by impartial and critical investigation. A complaint is an opportunity to make a friend, and the opportunity is with the individual in particular and not with the class of complaint in general. To satisfy means to hold business that probably was difficult and costly to get. To satisfy means the keeping of old friends and the making of new ones—and friends build up a business. In handling complaints, words are only one means of expression and manner is quite as important; a kindly and courteous manner is not only the sign and mark of a self-respecting man, but it is to words what oil is to machinery in making them move effectively to their purpose. The Man in the Street gives many opportunities for Utility Company employees to know him and please him. Perhaps no opportunity occurs more frequently than in the payment of bills. He probably calls at your office for this purpose once a month. If he makes such a call, pays his money and has his receipt handed him without word or recognition from the employee, he misses something and an opportunity for the company has been lost. If the next time he calls the clerk says "Thanks" when handing the receipt he feels a slight recognition of his existence. If on a third call the clerk says "Thank you" he feels more interested and if on the fourth call to pay money there should be a clerk with tact enough to see the name on the bill, and when returning the receipt to say "Thank you, Mr. Jones," the Man in the Street goes out with an appreciative smile, and the thought in his mind that he is known as a consumer and recognized as an individual. Too much importance cannot be placed upon the treatment of the Man in the Street as an individual who appreciates all the niceties in the relations of one human being to another, and above all he appreciates—

"How sweet and gracious, even in common speech,
Is that fine sense which men call Courtesy!
Wholesome as air and genial as the light,
Welcome in every clime as breath of flowers,
It transmutes aliens into trusting friends,
And gives its owner passport round the globe."

The Customer.

Some years ago in a certain Western city where there were three electric companies competing for business, a new theater was in course of construction. The three companies had identical rates for serving so that element did not enter into the competitive conditions. Mr. X, the business manager of Company "A," was watching the situation closely, and became somewhat discouraged when the report was brought to him that the owner of the new building was a stockholder in Company "B" and naturally would influence the lessee to sign with Company "B." Another report he received was that there existed a racial affiliation between one of the directors of company "C" and the lessee of the theater, and that Company "C" was sure to get the business. The lessee lived in a city several hundred miles distant. One evening as the manager of company "A" was about to close his desk, the office door opened and a stranger walked in. He asked the manager if he were Mr. X, and receiving a reply in the affirmative, he stated he was the lessee of the new People's Theater and wished to arrange for service. He explained to Manager X that there had been much influence used to swing his business elsewhere, but that men in the theatrical business had a way of inquiring from each other about certain matters. He had inquired from other theater managers as to which company gave the best service, and Manager X was informed that not only the theater men receiving service from his company, but others in the city all agreed that Company "A" gave the finest service, and looked after its customers in the most satisfactory manner. The Man in the Street listens, inquires and uses his own judgment when he is going to give his business, and your record for attention to the little things in service may often win you big revenue producing contracts.

A central station plant ought to be loaded twenty-four hours daily. It does not have to sleep. The load curve ought to be a straight line, before the electrical consumption of any community has reached the saturation point. New consumers are desirable, but the development of increased business with existing customers is still more desirable. For greater business from present investment we must cultivate the Man in the Street. It may be considered an axiom that no consumer is using as much as he could take to his own advantage, and the most profitable business is produced by inducing consumers to increase the number of uses of electricity. Much time and money have been spent in the past in an endeavor to clip a small percentage from the cost of manufacturing and delivering a kilowatt-hour. Economies of operation are to be commended, but the time has passed when it is simply a question of jumping a set of service wires to the consumer's premises, and dumping a few kilowatt-hours there each month. The time has come when it is up to us to interest ourselves more than ever before in the manner and method of using our product on the consumer's premises, so that the greatest possible economies and benefits may be secured.

The Man in the Street knows of no saturation point, neither should we. The Man in the Street is willing that the annual consumption per capita should increase year by year if he is benfitted thereby. It is up to us to show him that electricity and convenience are synonymous and in what direction new benefits may be obtained. There is no limit to intensive development of this kind—but it cannot be obtained by wishing and waiting. The point upon which this whole question of business development hangs is the ability to let the people know—in other words, to create the desire. The Man in the Street must be informed so that he may be fully advised as to the possibilities of electric service in the lightening of labor and in adding comfort and good cheer to the life of mankind. He is already in a receptive condition and is only waiting to be shown the wonderful capacity of electric energy in performing almost everything within the range of industrial and commercial life. All we need is men who have a thorough practical and intimate knowledge of the possibilities in the use of electric service. The possession of this knowledge fills them with confidence and enthusiasm, so that when they talk to the Man in the Street, the battle is as good as won. Obstacles are swept aside, objections are over-ruled, competitions are annihilated and, by-and-by, the Man in the Street, far from being saturated, will, like Oliver Twist, only ask for more.

The Investor.

The problem as to the future of public utility companies is one which occupies considerable attention in the public mind to-day, and is one which is of vital importance to the utility company and the public. There is a competition going on between public control and private ownership. Public control is attractive to many, but even its friends acknowledge that because of certain inherent conditions it must travel a long way before it reaches success. Private ownership has pioneered, nursed and developed the business, and the same qualifications which have produced so much good work in the past should enable it to continue and progress in the future. There is a greater need for co-operation between the utility company and the consumer than ever before. But co-operation is a matter of give as well as take. Sometimes it amounts to doing the other fellow's way when he won't do ours. The Man in the Street is thinking as he never did before—he looks at the utility company and believes it is prosperous. Why should he not share in its prosperity? Some wise man has said the best way to conserve private ownership is to increase the number of private owners. Who is brave enough to say that it is not the answer to the problem This is an age of frankness, directness and simplicity. If you really want more stockholders among your customers, you must go after them candidly and openly. Don't tell them the benefit will be theirs only—but that the advantages will be mutual. Not long ago one of the power companies in this State received authority to add a temporary surcharge to its rates. A certain consumer living in the territory supplied went to his neighbor one day and said, "How about this surcharge the power company is collecting? Don't you think we had better look into it?" The neighbor replied, "No, I have been making inquiries regarding the uncontrollable expenses our company has had to face, and we feel that the surcharge is justified." The other man exclaimed, "What do you mean by 'our company'?" The reply was, "Oh, I'm a stockholder of the Power Company."

What better plan for its own protection and prosperity can a public utility company adopt than by making the Man in the Street a full partner in the organization? If the company is properly managed, if it has made a favorable impression upon the Man in the Street, he is already predisposed in its favor, and it will not be difficult to convince him that in order to make the relationship perfect, he should be a stockholder. His desire to become a stockholder will probably be in direct relation to the treatment he may have received from your company in the past, and if he has been well treated the amount of stock he will take will probably be limited only by his financial capacity.

The conclusion which I have attempted to lead up to in the presentation of this address is that human beings are not like merchandise, nor are they to be handled like merchandise. Dealing with the Man in the Street is a problem in personality, and it is through the point of contact, wherever it may be: at the counter, over the telephone, through correspondence or when and where service may be rendered, that the favorable impressions are created which ultimately affect the prosperity of the utility company. The physical assets of a corporation may be of fabulous value and may make a handsome showing in an annual report to shareholders, but the value of that intangible asset, the confidence and good will of the Man in the Street, may be, after all, the one great element which produces earning power and gives stability to the property.

Accidents to Men who Handle Power Lines are Out of Proportion—and Largely Preventable

Accidents to employees of electric light and power companies show a very large percentage to the men who handle the lines as compared with other occupations incident to this industry.

Rules, regulations and precautionary notices regarding the handling of live lines are issued by many electric light and power companies and because of these rules and regulations, it is often assumed that dead lines only are handled, and in many cases no provision is made to take care of work on live lines, that is, insulating tools and appliances are not considered necessary and instructions for handling the work on live lines are omitted.

It should be remembered that some lines must be handled alive if continuous service is to be obtained, and caution is necessary whether the lines are dead or alive. Work on dead lines is mostly of an emergency nature. It is often done hurriedly and at night and the lines worked upon are generally in close proximity to live conductors. With proper care and equipment live lines can be handled safely. Why is it not good practice to keep the lines energized and handle them accordingly?

The following paper was read before a recent meeting of the Michigan Section of the National Electric Light Association. It contains some brief instructions to employees of electric light and power companies covering the safe handling of live lines and equipment.

Working Safely on Live, High Tension Lines—Live Lines and Circuits Ordinarily Dangerous

Ordinarily live, high tension conductors are dangerous to touch or approach, and they can only be handled safely by those who have been properly trained and equipped for the work. Energized electric light and power circuits should be handled carefully under all conditions, and in no circumstances is greater caution required than in the installation and repair of high tension lines and equipment.

Hazards Not Only Electrical

Some causes of accidents are common to most industries, and the danger to the electrical worker is not only due to shocks and burns, but also to falls from towers, poles or other elevated structures. Many conductors are placed underground, in conduits and in tunnels, and there is sometimes danger from explosive or inflammable gases. The question of asphyxiation of employees must also be taken into consideration. Coal or coke dust, or any deposit on the insulators in the nature of conductor, or partial conductor of electricity, increases the chances of flash-overs and danger to the worker. The weather affects operating conditions—rain, snow, wind, sleet, and lightning generally mean work for the trouble man, and quite often the most dangerous work to be done is during or immediately after a storm.

It is sometimes good practise to consider "dead" lines as energized and handle them accordingly. Lines supposed to be dead may be energized by the accidental closing of a switch; a live conductor may swing into and energize the supposedly dead lines; a dangerous potential may be induced from lines in the vicinity. Men working on long transmission lines have been injured when lightning has struck the line at a distant point. Lines should not be treated as "dead" or not energized unless they are short circuited and probably grounded.

Educating the Public

The use of electricity is daily becoming more general, and a net work of electric wires extends over and under the streets of our cities and across the fields of our country. The number of injuries due to the public, wittingly or unwittingly, coming in contact with live conductors is unnecessarily high. Experience teaches us that most accidental injuries can be prevented by education. Persistent instruction to the public would tend to decrease some of these accidents.

Scope of the Paper

In this paper an attempt will be made to outline some of the precautions to be observed for the safe handling of live or energized lines and equipment. It will deal more particularly with electrical hazards rather than those common to most industries.

Selection of Men for Line Work

Records show that linesmen and patrolmen, that is, the men who handle distribution circuits and transmission lines, sustain a large percentage of the fatal accidents to employees of the electric light and power companies and particular attention should be given to the selection of men for this work. In dealing with the problem of safety to linemen, it should be realized that most of the accidents are due to mistakes, lack of instruction or the incompetence of employees. Such accidents can be prevented by education. Very few of the accidents are due to mechanical or physical conditions of the property.

Construction of Lines

If the construction of the lines to be worked upon is of a temporary nature, the clearance and other physical conditions should be checked up. If it is essential that such lines be worked on while energized, it may be necessary to build special platforms and barriers before any work can be done.

Distribution Circuits and Transmission Lines

Electricity is sometimes generated and distributed at from 2,300 to 7,500 volts. In other cases it is generated at from 2,300 volts to 7,500 volts and it is then stepped up by means of transformers to from 30,000 to 150,000 volts and transmitted long distances and then stepped down again and distributed at lower voltage. On account of the greater difference in voltage between distribution lines or circuits, and transmission lines, two distinct safety problems are presented. Methods and practices that would be safe when considered in connection with distribution circuits, would be out of the question for the higher voltage transmission lines.

Special Insulating Rods Needed for Work on Transmission Lines

Live distribution circuits can be worked upon safely in good weather when the poles are dry without any intervention between the worker and the live conductors, except a good pair of rubber gloves or other comparatively thin insulating guard. It should be remembered that the dry pole renders protection as well as the rubber gloves. When work on high tension transmission lines is to be done, long insulating rods, tongs or similar appliances that isolate as well as insulate must be used.

Trained Men Essential

A competent crew of trained men is essential if work on live lines is to be performed safely. Too much care can not be taken in the selection and training of the foreman who has to take immediate charge of the work and all of the men must be instructed as to the character of all lines and equipment on or near which they are to work. Employees should not be left to learn their work by the "absorption" method, they should learn by the "intentional" method, that is, it should be the duty of some competent person to instruct them. Some foremen consider their duties fulfilled when they have briefly outlined to the men under them the work to be performed, but in order to insure safety they, or some authorized instructor, must give repeated and detailed instructions. Sometimes men do not fully understand or they forget their instructions. The foreman should satisfy himself that all of his men are competent and their knowledge of line conditions and hazards should not be taken for granted.

Insulating Tools and Appliances

In addition to being properly qualified to perform their work employees must be equipped with suitable insulating appliances for the safe testing and handling of live equipment and lines. All insulating tools and appliances must be inspected and tested regularly and they must be properly stored or taken care of when not in use.

Rubber Gloves

Rubber gloves, when not in service, should be stored in a dry and cool place where the temperature does not exceed 75 deg. F. The gloves should not be exposed to the light and each pair should be kept in a separate box. If rubber gloves have to be stored for any length of time, it is a good practice to take them out periodically and roll or crumple in the hands. They should then be straightened out and laid away again. This practice seems to revive the rubber and lengthens the useful life of the gloves. It should be borne in mind that a perfect pair of gloves can be rendered useless for work on live conductors if subjected to rough usage. They should not be worn while climbing as a splinter or a slight abrasion or puncture will destroy or lessen their insulating value and render their use a hazard instead of a protection. Special care should be exercised to avoid puncturing the gloves when making a wire splice. It is advisable to wear leather gloves over the rubber gloves to protect them.

Shields or Protectors

Linesmen's shields or protectors should always be used when work is to be done in tight places on distribution circuits. These shields which are of rubber, or some other insulating composition, are for placing over live conductors that are in close proximity to the lines on which the work is to be done. These protectors are guaranteed by the manufacturers to withstand all ordinary distribution circuit voltages. They are of great help to linesmen and their use should be encouraged. When not in use, shields should be placed in substantial boxes. They should be carried to and from the place where the work is to be done in these boxes. If this is not done, they are liable to be damaged by contact with the other tools in the line-wagon.

Linesmen's Spurs

Linesmen's spurs are necessary for climbing wooden poles, and they should always be in first class condition. The gaffs should be kept sharp and should be replaced when they are so short that they will not puncture into the wood far enough to hold safely. The straps and buckles should be inspected frequently for defects. Spurs should only be worn when they are actually needed for climbing. They should not be worn while travelling to or from work. Fooling and scuffing among linemen while wearing their spurs has been the cause of many accidents.

Safety Belts

Safety belts are essential for preventing accidents to linesmen, and yet quite frequently they are not used. The materials used in the manufacture of these belts should be the best obtainable and the workmanship should be of the best. They should be inspected frequently to make sure the straps, rings, snaps, rivets and buckles are in good condition. When using a belt, care should be taken to see that the straps and buckles, are properly secured before weight is brought to bear on them.

Rubber Boots and Coats

Special rubber boots and coats are now used quite extensively by linemen, their use being especially valuable when . . . .

work is to be done during or immediately after a storm where broken lines or falling wires have to be handled.

Ropes and Insulating Rods

The ropes used in connection with the work on high tension transmission lines should be impregnated with paraffin and kept in a canvas bag. The insulating rods should be thoroughly treated with paraffin. A drying room or oven should be provided where the tools can be thoroughly dried and then treated. This should be done at regular intervals.

All Insulating Tools and Appliances Should be of an Approved Standard and Inspected Regularly

Insulating tools and appliances should be of the best obtainable and employees should be instructed that they must not use anything else as a substitute. The insulation commonly placed around the handles of pliers, screw drivers and other tools used by linesmen serves to keep static away but should not be relied upon for complete protection. Rubber gloves, in fact, all insulators may lose their insulating qualities and become incapable of resisting high voltage by wear or by deterioration. If they are not inspected and tested periodically, their use may prove a hazard instead of a protection.

Instructing Employees

First: Employees should be instructed how to avoid shocks and short circuits when working on or near live conductors. Before starting any work they should be informed by the foreman which conductors they are to handle and which to avoid. The employees should be acquainted with the fact that if they are thoroughly insulated from the ground and all other conductors, it is comparatively safe to touch a single conductor, but that contact with two conductors or one conductor and the ground is dangerous and may result in injury. The foreman should caution his men to keep all parts of their body, as well as feet and head, away from live conductors. Rubber gloves and the insulation on high tension wares cannot be relied upon as a complete protection against shock and this also should be explained to employees.

Second: Linemen, before climbing, should be satisfied that the pole or tower is in good condition and strong enough to hear additional weight. Poles may he tested near the ground line for decay with a bar or screw driver, and sounded for decay at the centre of the pole by rapping with a heavy tool or block of wood. When poles or crossarms are apparently unsafe, they should be properly braced or guyed before any dependence is placed upon them for personal safety. No employee should go among any wires until he knows their condition and voltage, and knows that it is safe to do so. Leaning over and crowding through unprotected wires should be avoided.

Third: Sometimes because of leaking insulators, defective transformers or broken ground wires caused by storms, or other unusual conditions, poles or towers may he energized or "hot" and difficult or even dangerous to climb. If it is necessary to do work upon a line or circuit and conditions are such that pole cannot be mounted or climbed without danger, the circuit should be made "dead" at least until protective shields, barriers or other safeguards are in place. Employees should be instructed not to work immediately above unprotected live lines or equipment, as a tool, rope or a branch of a tree dropped across a high tension line might result in a flash with serious consequences. The rule "work from below" is a good one and should be enforced whenever practicable.

Fourth: Underground electrical workers are exposed to special dangers. There is always the possibility of gas in tunnels, conduits and manholes, and employees should be cautioned not to smoke and to keep all open or exposed flames from manholes. They should report to their superior officers unusual evidences of gas and should not enter a manhole opening if the slightest danger is evident. The use of a plumber's torch should be avoided as far as possible.

Fifth: Numerous accidents have occured to linemen when working on new extensions to distribution feeders, due to the fact that the extension has been connected or tapped on to the energized circuit before the new work was completed. New work should be finished and all of the crew engaged on the work notified before the "hot tap" is made.

Transmission Lines

What has been said in the foregoing applies more particularly to distribution circuits. The following will apply to transmission lines.

Transmission Lines Now Handled Alive

A few years ago working on live, high tension transmission lines was considered foolhardy and out of the question except in rare cases and under extremely dry climatic conditions. Today, insulating rods, tongs and similar appliances have been so developed that 140,000 volt transmission lines can be handled alive with no greater hazard than accompanies the handling of 2,300 volts distribution circuits with the protection afforded by rubber gloves.

Replacing Defective Insulator

By means of the improved appliance, the insulators on live, high tension lines can be tested while in position and the defective insulators weeded out and replaced with good ones.

Long Insulating Rods Used

Several different methods are used to test and change the insulators, the fundamental principle of them being that there is always a long insulating rod or other appliance between the man and the live part that is to be worked upon. Various patented devices in the shape of tools are used on the ends of insulating rods for removing and replacing tie wires on pin type insulators and for removing and replacing cotter pins on suspension type insulators. Special long handled testing poles for picking out defective insulators are also on the market. In testing insulators on live lines advantage is taken of the fact that a difference of potential exists between the cap and pin of a disc insulator. A wire fork on the end of an insulating pole is used in some cases for making the test, placing the wire across the insulator between the cap and pin. If the insulator is good a static spark is obtained and the absence of spark or a weak spark shows that the insulator is defective.

The following is a brief description of one of the methods used to change defective insulators in high tension lines. The insulators are first tested and the defective ones noted, a record being kept of the pole, or tower and the position of the insulators. A crew generally consisting of six men and the foreman do the work of changing the insulators. First, long insulating rods are attached to the wire and the line secured in position and held so that it cannot swing into the poles or towers. By means of rope blocks the rods are made to force the wire upward and away from its regular position. The insulator is then disconnected from the wire after which the insulator can be removed and replaced or any necessary changes made. With proper tools it is not necessary for any of the workers to approach or place their hands or any part of their body within dangerous proximity of any live conductor.

Special Precautions to be Observed in Case of Line Trouble

Noise and static on telephone lines, discharging lightning arresters or an unusual amount of static on or around lines and insulators indicates trouble and it may be due to defective insulators or to an "arcing" ground, on the high tension lines. Foremen should instruct their men to work with extreme caution at such times. It is generally advisable to stop the regular work of changing insulators until the cause of the trouble has been located. This precaution should always be heeded on systems with a grounded neutral.

Before any work on high tension transmission lines is undertaken, for the first time, a careful analysis should be made of the job. Each operation should be considered and men should be selected and trained for the different operations they have to perform.

It is interesting to note that linemen who have tried both methods of changing insulators would rather work on live lines with insulating rods between them and the line, than on "dead" lines without this protection. The dangers incident to the accidental energizing of lines that are supposed to be "dead" are eliminated. Emergency or rush work which always adds to the hazard is to an extent avoided and the work can generally be done in the day time when the light is good.

Telephone, telegraph, signal and other lines that parallel high tension lines are always liable to be more or less energized and dangerous to handle. This fact should not be overlooked in instructions given to linemen.

To Sum Up

The prime requisites for safe working on high tension lines are: Safe construction, a good foreman, competent workmen equipped with proper tools and insulating applances.

Large Shawinigan Contract

Official announcement is made of the closing of a contract for the supply of power by the Shawinigan Water & Power Co. to the new sulphite pulp plant being constructed at Three Rivers, P. Q., by the International Paper Co. This is situated on 70 acres of land now partly occupied by the St. Maurice Lumber Company, a subsidiary of the International Co. The initial supply of power will be 20,000 h.p., to be increased as required. The International Co. at one time had under consideration the development of the Les Forges and La Gabelle Rapids, which are low head propositions, but it is understood that these will be taken over by the Shawinigan Co. under the terms of the agreement with the International Co. The entrance of the latter concern into the Canadian field of pulp and paper manufacturing is another instance of the legislative action which has compelled American paper companies to cross the border. The International Co. have very extensive timber limits in Quebec, and under Quebec laws cannot import its pulpwood from Crown lands into the United States. The St. Maurice Lumber Co., the subsidiary which manufactures lumber at Three Rivers for the Canadian, United Kingdom and U. S. markets, and also pulpwood, owns six mills in the province of Quebec, five of these being rossing mills. The cut is chiefly spruce.

The project for a sulphite mill involves a boiler house, 90 x 65 ft., equipped with B. & W. boilers, to be heated with coal or oil. The main building, the sulphite mill, will be 560 x 85 ft. There will also be a chipper room, 100 x 50 ft., and two shops. Foundations are to be of reinforced concrete, while the buildings will be of steel with brick walls and metal roofs. The paper mill will be built later.

Further Judgement in Theft Case

Mr. Justice Coderre handed down judgment in the Practice Division of the Superior Court yesterday afternoon ordering the issue of a writ of certiorari in a case in which the legal question at issue is whether the Provincial Government has exceeded its powers in granting to the Montreal Light, Heat & Power Company authority under its charter to prosecute clients for stealing electric power.

Max Rosenbloom, merchant, was convicted by Judge Leet and fined $100 on a charge of having stolen electric power from the Montreal Light, Heat & Power Company at his store on St. Catherine street. The company prosecuted Rosenbloom in virtue of the powers accorded to it by Section 26 of its charter, which was granted by the provincial Legislature. The amount of the fine imposed under this section is payable to the company.

Counsel, in opposition to the conviction, petitioned for a writ of certiorari, to be directed against the Montreal Light, Heat & Power Company, and the magistrate. It was urged that the charge against the petitioner was virtually that of theft, and theft, being a criminal offence, fell under the exclusive jurisdiction of the Federal Government; that the Provincial Government could not legislate on criminal law; and while it had the right to give the respondent company its charter, it had no authority to put therein a section giving the company the power to prosecute people in cases of theft.

The writ was made returnable within the statutary delay of six days, when it will be argued on its merits.

C. G. E. Co. Joins "Society"

The Canadian General Electric Company, with headquarters in Toronto, has become a member of The Society for Electrical Development, as have several Toronto contractors and dealers. It is planned to extend the work of the Society throughout the Dominion on an increased scale. The Hon. Frederic Nicholls, who for over thirty years has been prominent in Canadian electrical industrial activities, is president and general manager of the Canadian General Electric Company. Mr. A. S. Edgar, supply sales manager, together with Mr. Horton and Mr. Mallett, from the main office, have recently been spending considerable time in the offices of the Society planning the co-operative work.

The company is at present building a further structure to house what it is claimed will be the finest and most complete electrical show rooms in the Dominion. Many unique features will be incorporated in this department, which will be operated largely for the convenience of the contractors and dealers of Toronto and the surrounding cities. There will be rest rooms, consultation rooms, with stenographers in attendance, rooms for demonstrations of electrical appliances and specialties and provision made for carrying on educational work within the trade.

Montreal Electric Luncheon

At the opening meeting of the Montreal Electrical Luncheon, held on October 1, plans for the coming season were discussed. Mr. W. H. Winter, who presided, referred to the annual increase in the average attendance—in 1916-17 it was 48, in 1917-18, 58, and 1918-19, 65. He was convinced that the luncheon had brought electrical men closer together, and had resulted in mutual advantage. He invited the co-operation of all those interested in the industry. It was decided to elect the following as a nominating committee for the election of committees: Messrs. P.T. Davies (chairman), S. Svenningson, E. S. M. McNab, W. P. Roper, R. Moncel, and J. J. Dougherty.

Thornbury Plant Destroyed

The Thornbury electric light plant was destroyed by fire on October 12. This plant was installed in 1913 and consisted of a 60 kw. generator, belt driven from a 75 h.p. water turbine. The plant is municipally owned.

A 32,500 kv.a. Waterwheel Generator

By R. B. Williamson[*]

The Electrical World prints a description of the 32,500-kv.a. generating unit for the Niagara Falls Power Company that has been under construction during the past year by the Allis-Chalmers Manufacturing Company. This unit is mounted directly above a 37,500-h.p. turbine, the two forming a close-coupled unit with but a relatively short distance between the two machines. Thus the shaft can be made short and stiff and the combined unit has but two guide bearings. one at the top of the generator immediately below the thrust bearing and the other directly above the waterwheel runner. To carry the generator a large cast-iron barrel of heavy-ribbed design is bolted to the cast-steel speed ring of the turbine, thereby transmitting the weight of the generator through the barrel to the speed ring and foundation below the wheel. This shell forms a pit liner and at the same time connects the wheel and generator rigidly together, thus insuring accurate alignment. The connecting barrel also forms a support for the operating cylinders that control the gate opening of the wheel.

With these large vertical units it is necessary to provide brakes for bringing the machine to rest and for holding it in case of leakage through the wheel. In this instance the brakes are operated by air pressure and engage the lower surface of the field spider rim. Since the support for these brakes has to be able to take the whole weight of the rotating element in case it is necessary to relieve the thrust bearing of the weight, the brake support has been designed in the form of a conical cast-iron shell made in sections and supported by the barrel connecting the wheel with the generator. This forms a strong, compact arrangement, and the brake support incidentally forms an air inclosure under the generator to prevent the air discharged by the fans from passing into the wheel pit.

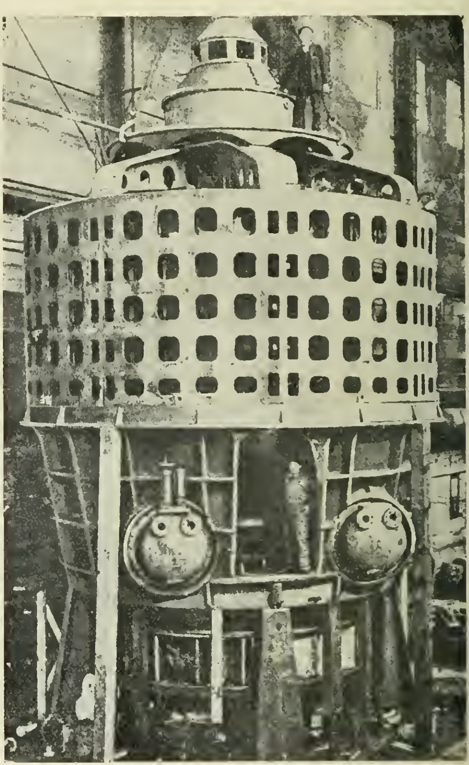
The generator is wound for 12,000 volts, three-phase, and will be operated with neutral grounded through a resistor. The frequency is twenty-five cycles at 150 r.p.m., the machine having twenty poles. While this generator is of very large output, the design in general does not differ greatly from that found in other large waterwheel machines. Since the speed of 150 r.p.m. is not so high as to introduce any unusual problems, the design of the rotor is less difficult than in many machines of much smaller output running at higher speed.

Based on the runaway speed of the waterwheel (approximately 85 per cent. overspeed), the stresses in the rotor will not in any case exceed one-third the elastic limit of the material. The rotor spider is made up of two wheels each of which consists of an inner cast-steel spider on which is shrunk a cast-steel field ring. Dovetail slots in the latter afford means for attaching the field poles, two dovetails being provided per pole. By this construction the field ring can be cast without local shrinkage stresses due to spokes, etc., because it is in the form of a plain ring made with uniform section.

Two rings were cast with exceptionally large risers, and very universal castings were thus secured. Other advantages in making the rings separate are that they can be machined inside, thus insuring better balance; moreover, any stretch due to centrifugal force does not cause local stresses in the inner spider arms. Each pole weighs approximately 3 tons, but the face of the rotor is so wide that the dovetail stresses are not more difficult to keep within safe limits than on many smaller machines. The total weight of the rotor with its shaft is approximately 265,000 lb., and the fly-wheel effect of the rotor is 10,500,000 lb.-ft. sq. Including all parts the machine weighs slightly under 300 tons.

For the stator yoke the usual box-frame design made in sections was employed to facilitate transportation and foundry work. The stator core will be stacked and the machine wound in the station. All parts have to be lowered over the cliff at Niagara Falls in order to place them in the power house, and this condition had to be kept in mind in designing the machine. When installed the stator yoke will be surrounded by a sheet-steel casing, which will conduct the hot-air discharged through the yoke openings to suitable ducts.

Dovetail projections hold the stator punchings in the yoke, the iron sections varying from 1¾ in. to 2 in. in thickness. Ventilating ducts are provided in the usual manner.



Combined waterwheel and generator—Rated at 32,500 kv.a.—
For Niagara Falls Power Company

The inside diameter of the stator punchings was fixed largely by consideration of the shipments of the rotor parts and the use of a solid rim for the rotor-field ring. In this case the diameter is 16 ft. 4 in., and the peripheral speed is 7700 ft. per minute. The outside diameter of the stator yoke is 21 ft.

Two-layer winding with fifteen slots per pole, or 300 coils in all, is used for the stator. The winding is arranged for Y connection, each end of each phase being brought out of the machine to permit the insertion of current relays and grounding the neutral through a resistance. Although the temperature guarantees are those corresponding to class

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[*] Engineer in Charge of Alternating-Current Design, Allis-Chalmers Manufacturing Company.

A insulation (A. I. E. E.), the coils are provided with mica insulation (Class B) both for the individual turns and also for the outer slot insulation, thus giving a large margin of safety.

Protecting Coils Against Short Circuits

While this unit has a very large output, the problem of supporting the ends of the stator coils against damage from short cricuits is not so difficult as in many machines of smaller output operating at high speed, as, for example, turbo-generators. The reactance of a relatively low-speed machine of this kind is high, in the present case about 20 per cent., and this limits the momentary short-circuit current to safe value. Again with a twenty-pole machine the coils do not project such a great distance beyond the stator core as in higher-speed machines. In the present design the coils are securely blocked just where they project beyond the core to protect them against any side motion and consequent danger of breaking the insulation at the ends of the slot. They are also lashed to the insulated supports as indicated in the accompanying sketch. These supports are made in sections and are bolted to projecting brackets cast on the stator end heads. The design is such that all metal parts near the coils are heavily insulated, and the supports themselves are arranged so that they cannot form conducting paths for stray currents induced by leakage fields from the winding. The diagonal parts of the coil ends are separated by blocking corded in place, and, in general, the method of coil support follows the practice that has been found successful in turbo-generators.

In designing the three generators for this development different manufacturers co-operated with a view to having the external appearance and general dimensions correspond as nearly as practicable, so that the finished installation would present a uniform appearance. The upper bridge that carries the thrust bearing has eight radial arms and is of cast steel made in two parts. Directly below the thrust bearing is the upper guide bearing, which is 22 in. in diameter and 36 in. in length. A Kingsbury thrust bearing, 49 in. in outside diameter and capable of carrying a suspended load of 465,000 lb., is provided. This has been ample to carry the weight of the rotor, waterwheel parts and downward hydraulic thrust on the turbine runner. Notwithstanding the heavy load supported by this bearing, the estimated friction loss is only 26 h.p. at 150 r.p.m. The bearing runs in an oil bath through which oil, supplied from a central system, is circulated at the rate of 35 gal. per minute. Where the shaft passes through the thrust bearing it is 18 in. in diameter; at the centre of the rotor spider the diameter is 26 in., The shaft projects a short distance below the bottom of the machine and is provided with a 45-in. diameter forged-on flange for bolting to a corresponding flange in the waterwheel shaft.

Arrangements for Oil

Special care has been taken in the design of the oiling arrangements in order to make these as simple and reliable as possible. Oil supplied to the machine from the central system first passes through a duplex strainer; it then flows through separate branches of the feed pipe to the thrust and guide bearings, each pipe being provided with a regulating valve and sight-flow indicator. An oil meter is placed in the thrust-bearing supply pipe, and thermometers are provided for both thrust and guide bearings. Seamless steel tubing expanded into flange joints is used for the drain pipe. An oil-feed pipe is of copper with brazed flange joints.

As this generator requires approximately 80,000 cu. ft. of air per minute for carrying off the heat, the arrangements for handling the air required careful consideration. Air is taken in at the top and also from the pit underneath, and, after passing over the windings and through the stator core, is discharged into the casing surrounding the stator yoke. It then flows through ducts and is forced out of the station by means of auxiliary fans. The rotor is provided with steel-plate centrifugal fans on both top and bottom to force the air through the machine. A strong blowing action is also exerted by the poles and the ventilating openings between the poles in the rotor rim.

Ontario Safety League Activities

Last May the Ontario Safety League announced a series of cash prizes for a composition by school children in Ontario on the subject "How Children May Help to Avoid Accidents." The prizes were donated by the Ontario Motor League to assist in the campaign against preventable accidents. Scholars were divided into two classes, 12 years and under, and 13 years and over, six prizes being given in each case, the first of fifteen, two of ten and three of five dollars each. The four best letters are given below as indicating the amount of interest that is being aroused in children on the importance of observing the admonition to "stop, look, listen."

First Prize—Class A

Children should form a habit of carefulness. Bad habits and carelessness are the cause of most accidents. The most important habits are obedience and listening to what adults tell us.

Because we see older people going close to moving automobiles we should not do it, because they do not get excited so readily.

We should train the little ones both by example and precept. In the evening take them to the park and keep them off the street.

When crossing the street watch the moving cars and the drivers' signals. We must always cross at corners. Cars should always run on the right-hand side of the street. This helps us to avoid motor accidents.

One day I saw a big boy sitting on the back of an automobile. This may have led to the death of a small boy who tried to do the same.

JAMES BRADLEY (age 10),
Cambridge Street School, Ottawa.

Second Prize—Class A.

Stop, before you cross the street, ...
To and from the school,
On your way remember this,
Precious, golden rule.

Look up, then down,
On left and right,
One careless run
Kills many outright.

Listen for the motor,
In the night or morning,
Stop, and listen for its horn,
Take heed unto its warning,
Even when you're in a hurry,
Never cross streets in a flurry.

HELEN HAGERTY (age 12),
St. Patrick's School, Toronto.

First Prize—Class "B."

Bobby's mother was tenderly putting him to bed, for he had just escaped being run over by a big green roadster on the highway in front of his home.

"Oh, mother," he sobbed, "how may I keep from being run over by those awful big fast cars?"

"There are many ways," replied his mother soothingly.

"You must be alert and keep looking in all directions when you are on any public highway. When you wish to cross the street or road, do so without loitering. When you play, invite all your little friends into the yard at the back of our house, where no automobiles intrude. Then, to save other little children from danger, you should not chatter to your father when he is driving our car, because you take his attention away from the road and his steering."

The mother stooped and, kissing Bobby good-night, added: "I hope you will remember this little talk and give all your litle friends this same warning."

ANNA B. RUSSELL (age 18),
Woodstock College, Woodstock.

Second Prize—Class "B."

How often we read of serious motor accidents! They are happening every day in our lives, and every one ought to do all in his power to avert such mishaps at the present time, when the chances of accident are so many and varied. Accidents may often be avoided by keeping the phrase "Safety First" always in mind.

Children especially, in the thoughtlessness of play, dash across the street without stopping to think of the silent automobiles gliding along. To prevent probable accidents here, I should say to all children, "Do not play games on the public streets at all." There is always some nice park near, where games can be played. Then, again, before starting to cross a street, every child should glance to right and left to make sure there are no autos near enough to harm him. Children should remember not to step out suddenly from behind a car or other vehicle, and they ought never to cross a street diagonally, especially at intersections.

MARGARET THOMSON (age 14),
Earl Kitchener School, Hamilton.

Turning Complaints Into An Asset*

"Who, where and what represents your point of contact with the public? Is that point of contact sharp pointed —hard; or is it well oiled and greased and non-friction producing? The public, whose servant you are, forms its opinion as to the kind of servant you are from its point of contact with the company, with the employees of the company who it comes in contact with, and the public will let its complaints be known to and through such employees. Many small and trivial complaints, made by the public, are received with equally small and trivial attention, and the public goes on from day to day feeling that its complaints are not received with that degree of seriousness that attaches to the mind of the party making the complaint.

"Complaints, when made and received, should be received pleasantly, considerately and thankfully. The party to whom complaints are addressed should be courteous, conciliatory and helpful. Your average customer does not know the president of the company, the vice-president, the board of directors or other executive officials of the company, nor does he care who they are, but he does know the troubleman, your lineman, your cashier, your bookkeeper, your complaint man and such other of your employees as he comes in contact with; and it is by the conduct of these people that he does know the company, and it is by his contact with these people that the reputation of the company in the community is established—that is, good or bad.

"Is your reputation in the community you serve good or bad? If it is not satisfactory to the public, not to you, then educate your points of contact with the public to the performance of their full duty to the public.

"The public is generally concerned only as to the character of service that you render, and embraced within the character of service rendered is, of course, the manner in which the public is handled and treated by your employees." Mr. Webster then went on to state that not more than 10 per cent. of the people who felt they had complaints to make made them, according to his experience with the U. S. Railroad Administration. It is important therefore that what complaints are made should be handled tactfully, that those making the complaints be shown courtesy and that their complaints be met and considered. He then went on to say that public relations could frequently be improved by more careful handling of complaints, thus bringing about a more satisfactory financial result to the company furnishing the service. A number of examples of different ways of handling complaints were presented, with their conclusions and morals.

"Which foot do you start out on in the handling of complaints? Is the company always right from the beginning, or is the customer sometimes right?" asks Mr. Webster.

"Satisfactory and friendly handling of complaints is one of the biggest assets a public servant has. The goodwill, aye, the good word spoken, as to the company's fairness in handling complaints means ever so much to the company; it increases the morale of its employees; it encourages growth in the community; it means sympathetic consideration in supplying increased revenue to meet increased costs of operation—all of which are vitally necessary in the successful operation of a public utility.

"Don't compromise just complaints and feel that you have served the company's interest; let the complainant himself suggest the solution and then gladly and freely and in a friendly way accept his decision; it means a friend in the community, a booster for the company's fairness; and additional money in the till at the end of the year.

"In conclusion: Make another study of your points of contact with the public; see if you have a friendly and smiley man or woman properly inoculated with the public point of view, handling your complaints; if you have not, make transfers until you do get one, and do it promptly.

"Receive complaints with a smile and with sympathetic consideration. Thank people for affording you an opportunity of making specific and special investigation as to matters affecting the operation of your organization. Assure them that their complaints will be handled promptly—then see that such handling is made.

"Don't compromise just complaints—go the whole route, and lastly lay all your cards on the table—face up—in explaining the result of your investigation; accept censure when due and promise to remedy the situation—then do so."

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*Mr. J. P. Webster, before N.E.L.A.

Death of Frank J. Lyman

Mr. Frank J. Lyman, managing director of the Lyman Tube & Supply Co., Ltd., Montreal, died suddenly on October 2, aged 42. He was the founder of the business, which was the successor to the railway department of John Millen & Son, Ltd., Montreal, of which department he was ten years manager prior to the establishment of the Lyman Tube & Supply Co., distributors in Canada for the National Tube Co., Canadian agents for the Electric Service Supplies Co., Philadelphia, and also for several high class electrical and mechanical specialties. Mr. Lyman's most notable characteristic was his loyalty to personal and business friends, of whom he had a large circle. His death involves the loss of a man of unusual business abilities.

The Synchronized Induction Motor

By Mr. F. Keith D'Alton

To the electrical engineer, the characteristics of the squirrel cage polyphase induction motor are very well known. It is the purpose of this article to illustrate the effects of so modifying the rotor of such an induction motor that the machine will automatically synchronize itself and will show considerable stability in operating as a synchronous motor.

The information in the following paragraphs was obtained from a series of tests on a standard one horsepower, four pole squirrel cage motor designed for operation on a 60 cycle, 220 volt, 3 phase supply.

In order that it would be possible to compare the characteristics of the machine after altering the shape of the rotor, with those of the same machine as a standard induction motor, a complete test was run before any changes were made in the mechanical construction. From these tests information was obtained which appears as dotted lines on the accompanying curves.

The forming of this machine into a synchronous motor required that four wide grooves (for four pole machine) be cut in the rotor so as to form in this rotating element four salient poles. There is room here for considerable difference of opinion as to the width and depth of these grooves which will give the greatest satisfaction, in other words, the highest pull-out torque.

The field form, i.e. the wave form of the flux in the rotating magnetic field, before alterations, was assumed to be a sine wave. With this assumption, it seemed best to make the width of the groove equal to 30 electrical degrees—or one-third of the pole pitch—and to cut it to such a depth that we would cut each rotor bar to its centre line in the section removed. In this way, the total pole surface would be two-thirds of the original cylindrical surface of the rotor.

A change of this nature will, of necessity, increase the maximum flux density in the iron, when operating (at normal voltage and frequency) as a synchronous motor, above the density when operating as an induction motor. It was estimated that this increase would be in the neighborhood of thirteen per cent. and this figure is confirmed by a comparison of the exciting currents under different conditions of operation. Due to this increased density which is accompanied by a reduction in core loss, the power factor as a synchronous motor is lower than as an induction motor.

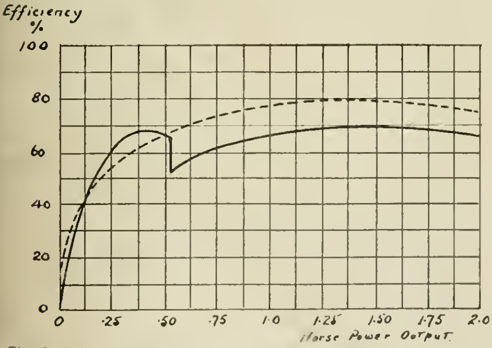


Fig. 1—Efficiency characteristics at 60 cycles with various loads; induction motor (dotted line) and synchronous motor

The following were the measurements made when running light:

	Synchronous	Induction
Volts	220	220
Amps.	2.4	2.13
Watts	120	155
P. f.	13%	19%
Freq.	60	60

The comparative characteristics of the motor under load are very interesting—In Fig. 1 are shown: Efficiency curves, both synchronous, and induction for 60 cycles operation. At an output of 0.512 horse power the motor pulls out of synchronism and runs as an induction motor with wider average air gap than before the mechanical changes were made.

As a synchronous motor the efficiency follows a curve of the shape that would be expected but higher than the efficiency as an induction motor. The increased efficiency on these low loads is probably due to the elimination of any slip and reduction of rotor iron loss up to the point of pulling out. After dropping out of synchronism, the efficiency is much lower, by apparently an almost constant percentage, than that obtained as an induction motor. The extent of the instantaneous drop in efficiency at the point of pulling out is clearly seen from the curve.

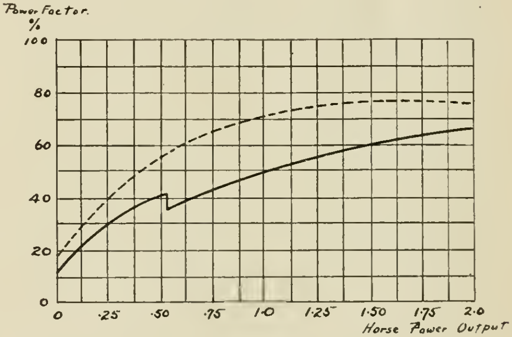


Fig. 2—Power factor at various loads, 60 cycles; induction motor (dotted line) and synchronous

Considering next, Fig. 2, it will be seen that the power factor as a synchronous motor is less than the original power-factor as an induction motor, not only when the motor is without load but with all loads which the machine is capable of carrying.

There is a distinct drop in power when the motor "pulls-out". This may be due to the fact that when running below synchronism the air gap is continually varying in width, thus increasing its reluctance at certain positions, and in effect the average reluctance is increased.

In the matter of slip (Fig. 3), it is at once realized that this factor must be zero up to the point of pulling out of synchronism. At this point, the slip appears and immediately reaches a value a little greater than when operating as an induction motor. The slip, however, does not increase with load as rapidly as may be expected, nor in fact, does it increase as rapidly as with the motor unchanged mechanically, with the result that the slip is about the same at full load, whether the motor be induction as originally, or synchronous with mechanical changes as previously specified.

In slipping, with the salient pole rotor, there is an irregular angular velocity. The rotor endeavors to pull back into synchronism each time the rotor pole passes an area of greater density in the stator flux. Failing to pull back, it slips quickly to the next pole. This results in periodic pulsations in speed which are most noticeable with small slip but practically disappear when the slip increases to about six per cent.

Since there is an increase in flux density in the synchronous motor over that existing in the same machine as an induction motor, it is not surprising to find that the line amperes drawn under these different conditions when running light are roughly in proportion to the flux densities. (Fig. 4).

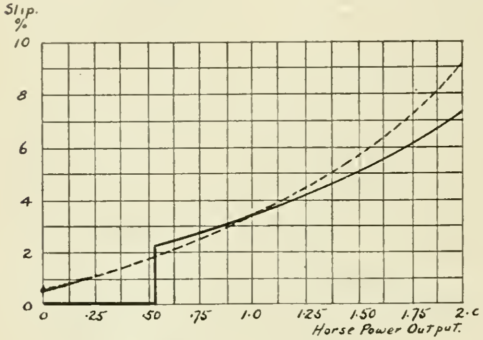


Fig. 3—Slip at 60 cycles, various loads

There is a rapid rise in current just before the motor pulls out., Possibly there is a crowding of flux to one side of the salient poles, resulting in increased density and consequently a rapidly increasing magnetizing component in the current. As the motor pulls out of synchronism the current immediately increases about fifty per cent. Since this is accompanied by a drop in powerfactor, it indicates a further large increase in the magnetizing component of current without much increase in the power component.

The pull-out torque of the synchronized motor is 1.5 ft. pds. The "pull in" torque is about one quarter of the pull out torque. With the machine as an induction motor a slip of 1.5 per cent. was required to give this torque (Fig. 5). Obviously then, with the salient pole rotor we have the advantage of synchronous speed with any required torque up to that at which the motor drops its speed, below that of synchronism.

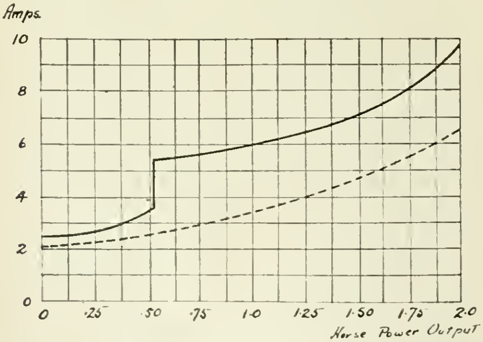


Fig. 4—Line current, 60 cycles; induction motor (dotted) and synchronous

Immediately the motor pulls out it drops two per cent. in speed but it would seem that the wider average air gap does not affect the slip as much as might be expected for the motor on the higher points of torque has less slip than when it was in the form of a standard induction motor.

In considering the advantages of this modification in the rotor probably the most important are as follows:

(a) Synchronous speed up to half of full load output.
(b) Increased efficiency up to half of full load output.
(c) Less slip on higher loads even though out of synchronism.

As a 25 Cycle Motor

The above motor, as already stated, was a 220 volt 60 cycle induction motor. Some further interesting results are obtained when this motor is run on 25 cycle current at 110 volts giving 750 r.p.m. as synchronous speed.

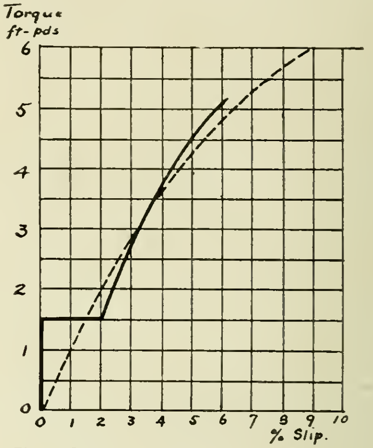


Fig. 5—Torque slip characteristics at 60 cycles

At half voltage on 25 cycles the flux density would be 120 per cent of the value it has at 60 cycles and normal voltage. Synchronous speed will be 41.66 per cent. of the 60 cycle synchronous speed, and since the horse power varies as (speed × torque)—i.e. as speed × (flux density^2—we would expect that the maximum horsepower obtainable before pulling out would be 0.4166 x 1.2^2=0.60 of the horsepower obtainable at synchronous speed with 60 cycles, i.e. 60% of 0.512=0.308 h.p. In actual test this figure is found to be correct. The tests check very closely in proving that pull-out torque does vary as the square of the maximum flux density.

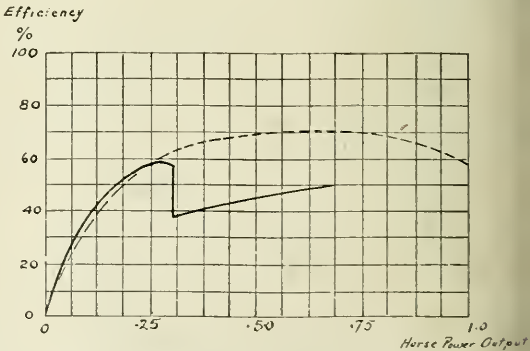


Fig. 6—Efficiency characteristics at 25 cycles, various loads; dotted curve is efficiency as induction motor

In Fig. 6 we have the comparative efficiencies at 25 cycles both as a synchronous and as an induction motor. Unlike the sixty cycle results (Fig. 1) the efficiency as a synchronous motor is lower than as an induction motor. There is again, however, the distinct drop in efficiency as the motor pulls out of synchronism.

The power factor as a synchronous motor, Fig. 7, being somewhat similar to the curves obtained in Fig. 2 is lower at all loads (also at no load) than as an induction motor.

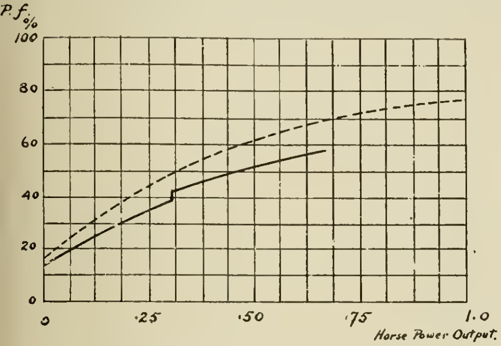


Fig. 7—Power factor at various loads, 25 cycles

In Fig. 8, it is again shown that the motor remains in step until an output of 0.308 horse power is demanded. At this output, as an induction motor the slip would be 3.7 per cent. Upon falling out of step the motor now slips to the extent of 5.3% and as the load increases further the slip increases being always greater with the salient pole rotor than when the machine was a standard induction motor. The effect of the widened average air gap is more noticeable here than in the results at 60 cycles. Fig. 3.

A rather unexpected result is found in Fig. 9 which gives curves showing the amperes per line. Although as with 60 cycles, the amperes at no load as a synchronous motor are greater than as an induction motor, there is a point, approximately at 1.1 horse power output where the amperes are equal for either conditions of the rotor.

Finally in Fig. 10 we find that the pull out torque is 2.16 ft. pds. or exactly 144 per cent. of pull out torque at 60 cycles. Fig. 5. Since the flux-density maximum at 25 cycles is 120 per cent. of the maximum density at 60 cycles we find we have proven what we stated before, i.e. that pull out torque varies as the square of maximum flux density.

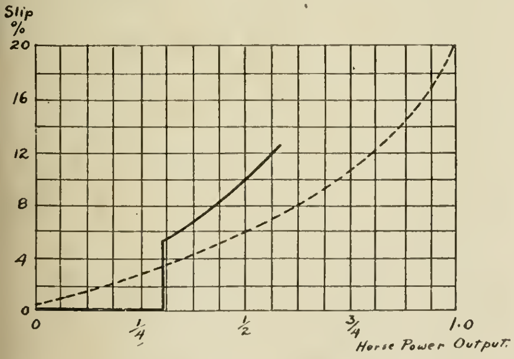


Fig. 8—Slip at 25 cycles, various loads

In considering again the advantages of the alteration in the rotor if the machine be run at 25 cycles with 20 per cent. increase in density, and comparing them with the 60 cycle results we have the following:

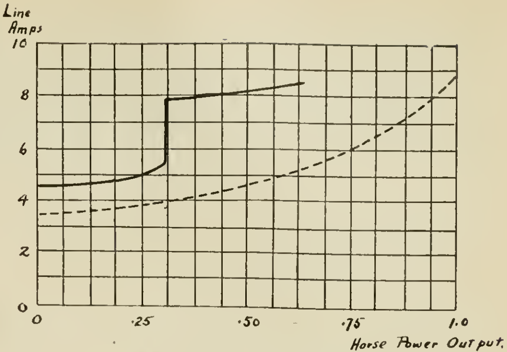


Fig. 9—Line currents at 25 cycles

(a) Synchronous speed up to about half of full load output.

(b) Decreased efficiency at all loads.

(c) Increased slip on all loads after machine falls out of synchronism.

Obviously, a noticeable change takes place when the flux density is increased from the value it has at 60 cycles (normal voltage) to 120 per cent. of that value. The slower speed alone probably accounts for the decreased efficiency.

At 60 cycles with the same density as was used at 25 cycles, the torque and maximum horse power output would each be increased 44 per cent. This would require an impressed voltage of 264 volts, would require the same current as in the 25 cycle test for a given torque and would raise the maximum output available at synchronous speed to approximately three fourths of full load, very materially increasing the efficiency as a synchronous motor but lowering the power factor.

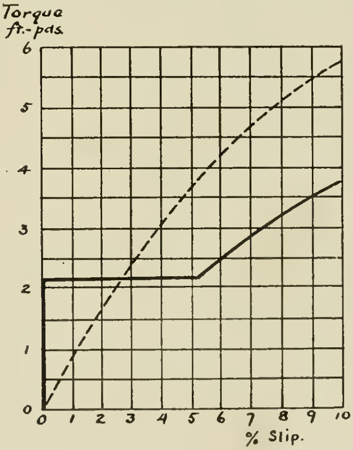


Fig. 10—Torque slip characteristics at 25 cycles

From a further comparison of tests already described, the following general conclusions may be drawn:

(1) That about half full load is obtainable with synchronous speed at normal voltage.

(2) That three quarters of full load is obtainable with synchronous speed when the voltage is 20 per cent. above normal.

(Concluded on page 44)

The Contractor-Dealer

The Hardware Man Does Not Take Naturally to Electrical Merchandising—Will the Contractor-Dealer Do It?

At a recent convention of Ontario hardware men, a representative of one of our largest electrical jobbing houses read a paper, portraying in very attractive colors the advantages that would accrue to the hardware merchant who handled electrical devices. Before the National Hardware Association of the United States, at present in convention, the secretary of the American Washing Machine Manufacturers' Association is deploring that "the proportion of production of the washing machine industry distributed through the hardware trade has declined."

On both of these occasions the speakers make direct appeal to the hardware merchant to "butt" into the legitimate field of the electrical dealer.

What is the reason of this?

It can surely be taken for granted that the manufacturer of electrical devices is not naturally disposed to prefer a hardware dealer to an electrical dealer. The inclination would, naturally, be to favor the electrical dealer. The manufacturers' business depends, however, on the amount of his equipment that reaches the homes of consumer and in the last analysis, as a business proposition, he cannot afford to let sentiment play any part. If he can gain his purpose through the hardware merchant more readily and more effectively than through the electrical merchant, he is scarcely to be blamed.

The moral to be drawn from the situation, however, is that the merchandising of electrical appliances is not yet on a satisfactory basis. The fact is that valuable merchandise is for sale and the consumer is waiting with the money in his hand to buy it. The "missing link" is the electrical dealer who will undertake to bridge the gap that is so evident. The hardware man has done this in part because he was established as a retail dealer, but, as shown by the statement quoted above, he is not proving a satisfactory substitute for the electrical dealer.

In making his plea to the hardware association, the secretary of the Washing Machine Manufacturers' Association, Mr. Raymond Marsh, made some very important statements, many of which are applicable in similar ratio to Canada. Being forewarned is being forearmed and we have, therefore, pleasure in reproducing extracts from this paper in the hope that it will enable the electrical contractor to see the situation in its true light. The business is there if the electrical dealer wants it and will take it, but he must not wait too long. In a little while the hardware man and the drug store and the department store and all the others will have accustomed the public to looking for electrical devices among their stock and it will be increasingly difficult to regain his trade. Mr. Marsh's remarks follow in part:

At the very outset I ask you to note that present-day conditions make "electrical household specialties" a necessity—and not a luxury—in every one of the seven million homes wired for electricity. In addition, the remaining fifteen million homes in this country are now demanding household specialties, not electric, such as hand, water, and gasoline-power washing machines, gas ironing machines for household use, etc.

The "Electrical Household Specialties" industry today includes the following articles:—

Electric Fans
Electric Heaters
Electric Toasters
Electric Sad Irons
Electric Heating Pads
Electric Curling Irons
Electric Chafing Dishes
Electric Vacuum Cleaners
Electric Lamps
Electric Washers
Electric Lanterns
Electric Door Bells
Electric Grinding Machines
Electric Light Sockets
Electric Light Fittings
Electric Cigar Lighters
Electric Coffee Percolators
Electric Toys
Electric Portable Drills

A glimpse at the size of the industry can be obtained from the following figures, which are conservative:—

Number of homes wired, 8,000,000.

Increase in number wired, 250,000 to 300,000 per year.

Up to 1918 about 10,000,000 household electric appliances had been sold. From July, 1917, to July, 1918, about 332,000 vacuum cleaners were sold.

In 1918 686,000 heating and cooking appliances were sold through electrical channels.

In 1919 about 200,000 individual farm lighting plants will be sold.

In 1919 there were 3,000 manufacturers of electrical devices.

Out of about 15,500 hardware dealers rated at over $5,000 in this country, only about 2,500, or 16 per cent., are selling household appliances.

In the early days of the washing machine business the manufacturers distributed a large proportion of their production through the hardware trade, jobber and dealer. The relation which was developed between the hardware dealer and jobber and the manufacturer was, and still is, equitable and profitable to all parties concerned.

During the last several years, however, the proportion of the production of the washing machine industry distributed through the hardware trade, dealer or jobber has declined and not increased. This is an unfortunate condition; and yet, it is a fact which you gentlemen should face and endeavor to remedy. If the manufacturers are at fault for this condition, they would like to know it. If the hardware trade is at fault, then, surely, you, gentlemen, would like to know it.

The present demand for household labor-saving devices, electric or driven by other kinds of power, is far in excess of supply. Numerous manufacturers of these devices have doubled their producing capacities and deliveries within the past year. They are using every intelligent, legitimate effort to increase production, and they are getting results, in spite of handicaps merely suggested by the phrases "labor problem," "transportation difficulties," "shortages of basic materials," such as motors, wringers, polished and trimmed copper sheets, etc. In our industry alone, we can show results in the way of increase of deliveries, by units and not money, of over 95 per cent., comparing our deliveries by units second quarter of 1918 to second quarter of 1919. These are facts beyond dispute which show that the household specialty industry is a growing one which you gentlemen cannot and dare not neglect.

Today, with all of the increase in production, the manufacturers of household labor-saving devices are far behind on orders. The demand for these devices has just started. The hardware trade, to some extent, is cashing in on the demand today, but it must prepare itself to meet the demand of tomorrow and the conditions of tomorrow. What will the demand be tomorrow and what will the conditions be tomorrow?

Every user of a hand, water or gasoline power household labor-saving device is an excellent prospect for an electric power device as soon as the home is wired. The rate at which homes in this country are being wired is remarkable.

The women of this country are directing their energy toward the factory and the office and away from the household duties. Everybody is urging increased production to reduce the cost of living. Women are doing more than their bit in this job to increase production; and as the scope of their work develops and broadens they will have less time to devote to household drudgery—and, under present conditions, drudgery is exactly the word to use in describing household work. These women are learning about machinery, production, labor-saving machinery, the planning of factory work—and they are fast losing their fear of machinery of any kind or description.

Who or what will clean and iron the clothes, wash the dishes, clean the rugs, cook the meals, etc.? Household servants and washwomen are now so scarce, in a relative way, that they are demanding and getting fortunes for their services. The sky only is the limit by which they set their daily wage. The answer is—washing and ironing machines for household use, electric dish washers, vacuum cleaners, toasters, ranges, etc.—the whole series of electrical household specialties for use in the city and in farm homes by reason of individual farm lighting plants.

The demand for these devices will greatly expand, because we are not developing a servant class in this country. Unlike in England and in France, your wife or my wife cannot find a servant who is or will be proud of her job and proud of the fact that she works for you or for me. Servants' and maids' unions may be formed here as they have been in England and France; their hours of work and rates per hour may be standardized here as they have been in England and in France; but the fact remains that, in a relative way, good household servants are as scarce as hen's teeth, and that we are not developing a servant class in this country. Add to these facts the proposed restriction of immigration and you get but a glimpse of the possibilities of making money by distributing labor-saving devices.

Household servants are making it a condition that the home be furnished with labor-saving machinery if they are to stay. The housewife, if she has no servants, now realizes how much more of a necessity these labor-saving devices are. On the point of solving the problem of clean clothes for the family, she knows, only too well, that the most economical and the most sanitary way of getting clean clothes for the family is to have the washing and ironing done in her own home. She has had all she wants of the public laundries.

The war has done more to increase the use of household labor-saving devices than anything else could have done.

What will be the conditions under which these household labor-saving devices will be sold?

The jobber or the dealer handling most of these articles today is in a position to pick and select his customers. Demand exceeds supply. Deliveries, because of shortage of certain basic raw materials, in many cases, are slow and uncertain. The jobber or the dealer who takes his discounts is getting the better service. He, in turn, selects the customer who takes the discount and who pays cash. The whole industry is being placed on a more solid basis and foundation. Plans for financing customers who purchase on deferred payment plans have been developed which will adequately and properly protect both dealer and customer. Here is an industry with unlimited powers of expansion, with possibilities indescribable. Its product is an absolute essential under modern living conditions. Properly planned, the industry will develop on a most solid foundation. Manufacturers of automobiles now sell their product cash against documents. Why shouldn't the manufacturers of these electrical household specialties do likewise? By so doing, they will develop for themselves a most responsible group of jobbers and dealers who can adequately cover their respective territories and who will make out of their distributive function real profits commensurate with the opportunities now open in this great field of industrial endeavor.

Gentlemen, an opportunity is now knocking at your door. Properly welcomed and developed it will make for you and your companies real profits far in excess of any you have ever dreamed could be made on the distribution of household appliances. This distribution field is before you; it is open to all alike; it awaits your intensive cultivation. If you do not start to work on it, others will. Don't wait too long.

Banfields' Metaloid Fixtures

A new line of lighting fixtures which promises to be in good demand is the "Metaloid" range, now being produced by W. H. Banfield & Sons, Limited, Toronto. These fixtures have all the massive appearance of fixtures made from cast brass, and, at the same time, we understand, will retail at practically the same price as cheap stamped fixtures. The range includes 2-light, 3-light and 4-light fixtures, all of the same pattern; also a 3-chain hanger for semi-indirect lighting and brackets in round or link end. They are being supplied in various finishes such as bright flemish, bronze and gilt, rich gold and matt, rich gilt and matt and brushed brass. These fixtures are guaranteed not to tarnish, as it is claimed they will retain their finish quite as well as fixtures made from brass, bronze or copper. Samples may now be seen at the company's show rooms, 80 King Street West, Toronto.

Will Hear Goodwin at Buffalo

An electrical show is being held at Buffalo on October 24 and 25, Friday and Saturday. Mr. W. L. Goodwin is one of the attractions, and a number of Toronto, Hamilton, Brantford, Kitchener and Waterloo delegates have signified their intention of running over to the show and gathering in a little more inspiration from the magnetic Goodwin. Mr. Goodwin speaks on Friday evening, and present indications are that the delegates will have to spend one night in Buffalo.

Increasing Shawinigan Capital

Shareholders of the Shawinigan Water & Power Company have approved of the by-law passed by the directors in July last providing for the creation and issue from time to time of first and refunding, sinking mortgage bonds to a maximum of $50,000,000.

The Automatic Electric Company, Toronto, Albert P. Lintz, general representative, have been awarded the contract for equipping automatic telephones and code call system in the plant of the Sheet Metal Products, Limited, Toronto.

Electrical Contractors Meet in Brantford

On Tuesday, September 30th, an interesting meeting of the Telephone City Electrical Club was held in Brantford. The majority of the Brantford members were present, Mr. V. K. Stalford and Messrs. Culley and Reid of Hamilton, and the full membership of the Twin City Electrical Club, which includes Kitchener and Waterloo. Mr. K. A. McIntyre, chairman of the Toronto District was also present and addressed the contractors briefly, outlining the organization and history of development of the National Association of Electrical Contractors and the Ontario Association. The Brantford meeting was called primarily to discuss the matter of affiliation of the three associations represented, as districts of the Ontario Association. At the close of the meeting a roll call was taken to get the opinion of the members which showed that there was no one actively opposed, though a number asked time to consider the matter a little further. The majority of those present, however, expressed themselves as heartily in support of affiliation. There were some complaints that the local association had not fulfilled the mission for which it had been found but it must be remembered that the value of the small association depends very largely on the success of the larger movement, which will bring all the local organizations together into one big provincial association. Members frequently ask the question, "what will I get out of being a member of the association" or "what did associations ever do for me." This, however, in our opinion, is not quite the correct attitude. We believe the members should rather ask themselves, "what means will these organizations provide for me to get something more out of my business than I am getting at present." The value of an "association" is something like advertising. It is difficult to trace immediate results directly to it. There is no doubt, however, about the ultimate gain. The Ontario Association is being organized along sound lines and there is no contractor who will fail to feel the benefits in his business, if he throws himself heart and soul into the organization, puts his shoulder behind the officers and comes forward to take his share of the work on occasion, instead of leaving it for somebody else. At best, no man should condemn an association as useless until he has given it a fair chance to show its usefulness—that means, until he has performed some useful work, himself, in the association.

Toronto Contractors Urging Technical Education of Workers

The Toronto District of the Ontario Association of Electrical Contractors & Dealers are co-operating with the Toronto Technical School in an endeavor to have the apprentices of the former attend a suitable course at the school. At the first meeting of the season, held in the King Edward Hotel, a number of the contractors expressed themselves as heartily in favor of all their apprentices taking an electrical course at the Technical school and stated that in the majority of cases the men showed themselves eager to take this course. Mr. McIntyre explained that a special class was being formed to take care of the electrical contractors' aprentices and particularly the returned men. The Technical school authorities had expressed themselves as willing to consider any change in their regular curriculum that the contractors might find necessary in order to render it more exactly applicable to the needs of men who would be engaged in practical electrical installation in residences, factories and other buildings.

Steps are being taken to collect all information as to the number of apprentices at present taking this course, and a card, of which the reproduction below is a duplicate, is being filled in by each employer for each one of his apprentices. These will be filed in the secretary's office for reference. All contractors are urged to send in their cards without delay.

Toronto District—Ontario Association of Electrical Contractors and Dealers

TECHNICAL EDUCATION OF ELECTRICAL APPRENTICES

Name of Apprentice . . . .

Address . . . .

Age . . . . . . Classification (1st, 2nd, 3rd or 4th Year) . . . . . .

Has he ever taken Journeyman's Examination? . . . .

If so, why unsuccessful? . . . .

What previous education? . . . .

Previous courses at Toronto Tech. School? . . . .

Results? . . . .

Remarks:

Date . . . . Present Employer . . . .

Card being filled in by employers

It is interesting to note that the Toronto contractors are taking this important step in the direction of educating their apprentices to be better workmen. Mr. Gunn of the Electrical Workers' Union, who was present and spoke briefly, expressed himself as heartily in favor of the move as tending to increase the standard of the worker. Mr. Gunn also strongly advocated the licensing of the electrical worker, thus showing himself to be entirely in unison with the views expressed on a number of occasions by the contractors themselves. It is to be hoped that the united efforts of the contractors and the electrical workers will result in the near future in some form of licensing being adopted.

This first meeting of the association was well attended and the indications are that the winter's work will go forward enthusiastically.

Announcement has been made that the Domestic Engineering Company, of Dayton, manufacturers of Delco lighting and power plants, has been taken over by the General Motors Corporation.

The Synchronized Induction Motor

(Concluded from page 41)

(3) That the power factor with salient pole rotor is always lower than as an induction motor.

(4) That efficiency may be higher or lower than as an induction motor depending solely upon the frequency and flux densitiy.

(5) That pull out torque being independent of frequency, varies as the square of the flux density.

(6) That on high densities slip is greater with salient pole rotor than as a standard induction motor. Vice-versa with low densities.

In synchronizing the motor under load (i.e. a load demand of less than that at which the motor pulls out of synchronism) it is necessary to raise the voltage impressed on the stator of the motor to probably twenty per cent. above normal until the motor pulls in and then lower the voltage to the normal value.

When the motor is running "out of synchronism" it emits a pulsating humming noise and the frequency of these pulsations is proportional to the slip, one beat occurring each time a pole on the rotor passes an area of greatest stator flux density. When in synchronism these pulsations cease and the motor runs even more quietly than as an induction motor.

Electrical Goods Sell Best on the Instalment Plan—How They Do It In the U. S. A.

The problem of financing the instalment plan has been solved for the U. S. contractor by an arrangement between the Association of Electrical Contractors and Dealers and the Morris chain of banks—under what is known as the Morris plan. There are 102 Morris plan banks or companies located throughout the United States. The contractor explains the situation to the housewife in some such advertisement as follows:

> We Actually Increase the Purchasing Power of Your Dollars.
>
> You Can Buy Our Washing Machines At
>
> CASH PRICES ON TIME PAYMENTS
>
> Through Our Arrangement With The Morris Plan Company
>
> NO RED TAPE—NO DELAYS.
>
> Here is the whole story in a simple example: You wish to buy a washing machine worth $125.00, cash price.
>
> You pay down ... ...$ 25.00
> To extend ten month's credit to you on the remaining $100, the Morris Plan Company charges 6 per cent. discount, which is 5.00
>
> Total cash paid by you ... ...$ 30.00
> You pay $10 a month for 10 months to the Morris Plan Company 100.00
>
> Total cost $130.00
>
> This means a saving of from 20 per cent. to 33 1/3 per cent. over the prices you would be forced to pay at Instalment Stores.

The housewife, already familiar with the numerous advantages to be gained from owning a washing-machine, now sees her way clear to buy one on reasonable monthly payments, at a price which is right.

When she has paid $30 in cash, she signs a Retail Trade Acceptance for the remaining $100, which the merchant endorses and the bank discounts at 6 per cent. Thereafter, the bank handles the entire transaction, relieving the merchant of all details of collecting and recording the time payments. For the privilege of being relieved of these details, the contractor-dealer pays a service fee to the bank at a fixed rate, according to the amount of the purchase. In the example above, the rate is 2 per cent. Thus, a merchant receives a total of $93 for the Retail Trade Acceptance and a total of $123 cash for the sale of the machine.

Can Continue Cash Business.

The Retail Trade Acceptance is accompanied by a Conditional Sale Agreement, providing for a lien on the goods. Both the agreement and the acceptance are on the same sheet of paper and the customer signs her name only twice. The goods are protected by fire insurance obtained for 1 per cent. of the selling price, which is usually included in the selling price.

The great advantage of The Morris Plan to contractor-dealers is that it enables them to conduct their business on a cash basis and at the same time to increase the volume of their sales by extending the benefit of time payments to their customers at prices lower than can be fixed by instalment houses with capital tied up in hundreds of outstanding accounts.

The rapid growth of the plan is accounted for by the fact that the contractor-dealer who discovers its possibilities immediately devotes a large part of his local advertising to advantages which it offers to customers. Hundreds of local newspapers thus carry daily displays making in the aggregate a great national campaign. Nearly all of these advertisements are simple and direct although they feature a great variety of articles for sale.

The advantages which may be gained by use of The Morris Plan in sales of electrical supplies also apply to the business of house-wiring contracts. The principles of the plan as applied to housewiring contracts are the same as in time payment sales of merchandise, but there is a slight difference in the detail of operation owing to the fact that in the time payment sale, one of the most important elements is a lien on the merchandise, whereas it is not feasible to obtain this in a house-wiring contract.

The plan is, therefore, to base all financing of house-wiring contracts on the credit of the contractor-dealer and his customer and to dispense with the lien. Under this plan the contractor-dealer draws a Morris Plan Retail Trade Acceptance on his customer, which, upon being accepted by the customer, is turned over to The Morris Plan bank with the contractor-dealer's endorsement and he receives the net proceeds. In lieu, the contractor-dealer makes a deposit with The Morris Plan bank, this deposit being non-withdrawable until the customer has paid the Trade Acceptance in full, and on all such deposits the bank allows interest.

Must Have Good Reputation.

The Morris Plan banks throughout the country emphasize three facts. Before they will give a credit rating to a contractor-dealer and do business with him, they must be satisfied that his goods and service have already won for him the confidence of the community. Only articles which are of real utility are sold through the plan. The Morris Plan banks expect the contractor-dealer to sell such articles only to purchasers who have a reputation for meeting their obligations and the banks reserve the right to reject the account of any person who, in their opinion, would not meet his payments and thereby make it necessary for the merchant to settle the obligation.

The inauguration of this system of financing has marked a great advance in time payment merchandising, which, up to now, has been one of the loose ends in American business. Through the plans, a merchant can increase his volume of business and his profits as a brief calculation with pencil and paper will readily show. If he has been able to turn over a capital of $50,000 four times a year, he can, with the aid of The Morris Plan Retail Trade Acceptances, turn over the same capital at least eight times a year through obtaining cash from increased sales resulting from the offer of time payments to customers.

The plan satisfies customers because they see clearly that they are buying at cash prices and paying only 6 per cent discount for the benefit of a year's credit.

Should Develop New Business

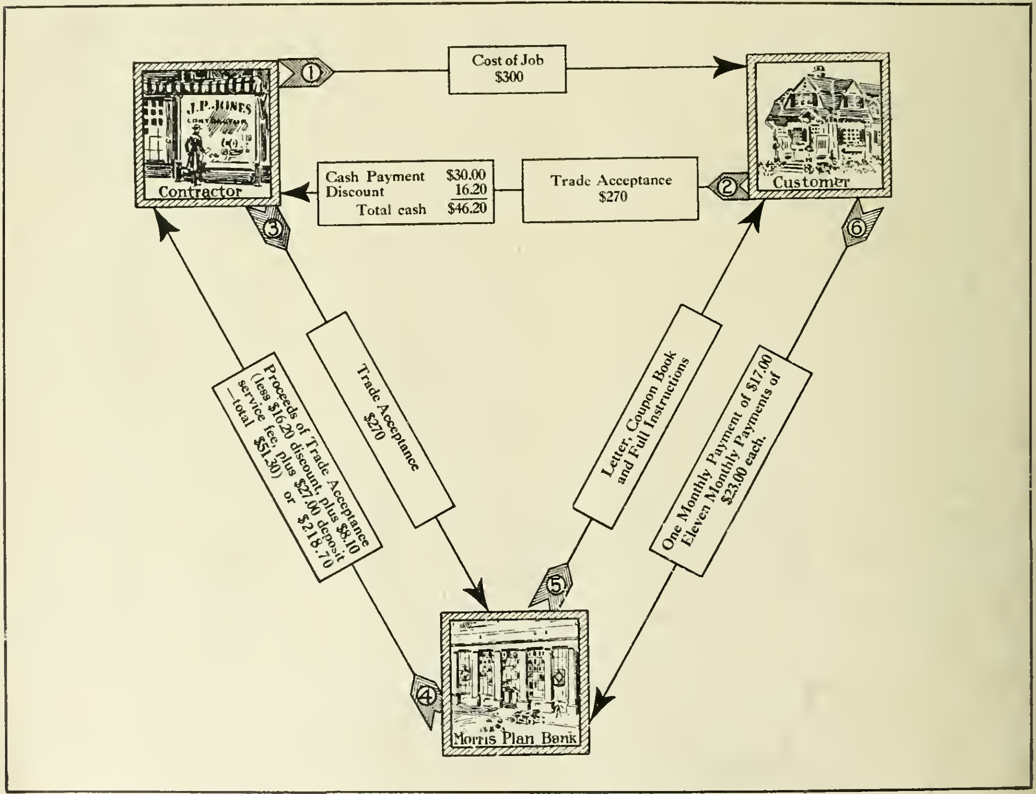
Progressive merchants in cities where Morris Plan banks are located are now adopting The Morris Plan. Those who are first to adopt it in a new community appear to be obtaining a decided prestige over competitors and their monthly sales reports are the best proof of the ease and safety with which a large amount of new business may be developed.

In the opinion of many merchants, some of whom have used the plan for more than one year, a contractor-dealer should develop a large amount of new business which he could not obtain without the aid of some such system of financing time payments; he can obtain spot cash for this business, make a large addition to his yearly profits, and at the same time, be free from the burden of all detail in connection with the time payments since The Morris Plan bank takes this off his shoulders.

The interesting diagram shown herewith is the method adopted by "Electrical Merchandising" to illustrate more clearly the plan of financing house-wiring contracts on this time-payment basis. This particular job costs $300. On the completion of the job the contractor draws up a "trade acceptance" on his customer, which is accepted by the customer and turned over by the contractor to the bank. In this case the trade acceptance is for $270, which is accompanied by a cash payment of $30 and a discount payment of $16.20, a total of $46.20. The third step in the operation is the transfer of this $270 trade acceptance to the bank. The contractor keeps the $46.20. The bank deducts from the $270 trade acceptance the discount of $16.20, a 10 per cent. deposit of $27, and a service charge of $8.10, total $51.30, and returns to the contractor the balance, $218.70. The contractor has now received $218.70, plus $46.20=$264.90. and has on deposit $27 at the bank. From now on payments are made by the customer direct to the bank, which, in this case, amount to a $17 first payment, and eleven consecutive monthly payments of $23. When the customer has paid up in full, the $27 bank deposit is returned to the contractor, with interest at 5 per cent. The contractor thus gets his full $300, less the service charge of $8.10. A similar plan is offered to contractors for financing the sale of electrical appliances.

New Line of Induction Motors

R. E. T. Pringle is distributing catalogue No. 6, describing, with illustrations, their new line of induction motors, manufactured by the St. Louis Electrical Works, St. Louis, Mo. The list comprises single, 2 and 3-phase motors, 25 to 60 cycles, 110 to 440 volts in sizes ranging from 1/8 to 20 h.p. It is claimed that the efficiency of the St. Louis motors is exceptionally high along the whole range of sizes, and that a 1 h.p. has practically as high an efficiency as the 20 h.p.

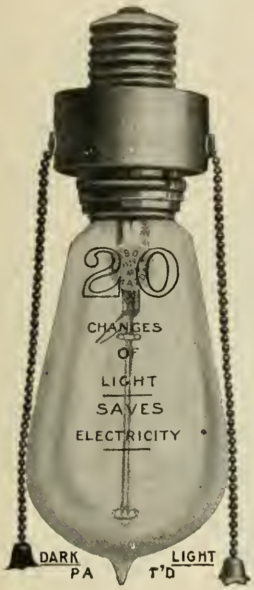

①
Cost of Job $300
J.P. JONES
Contractor
Customer
Cash Payment $30.00
Discount 16.20
Total cash $46.20
Trade Acceptance $270
②
③
⑥
Proceeds of Trade Acceptance (less $16.20 discount, plus $8.10 service fee, plus $27.00 deposit —total $51.30) or $218.70
Trade Acceptance $270
Letter, Coupon Book and Full Instructions
One Monthly Payment of $17.00 Eleven Monthly Payments of $23.00 each.
⑤
④
Morris Plan Bank

A wiring job costing $300 is diagrammed in this chart, illustrating the Morris Plan proposal for financing time payments on house-wiring. The plan involves three parties: The contractor, the customer and the Morris Plan bank. The arrows indicate the direction of the actions in financing the deal. The numbers on the arrows indicate the sequence of the action. For example: A contractor sells to a customer a $300 job. The customer returns to the contractor a cash payment of 10 per cent. of the cost (and in this case including the discount) and a trade acceptance for the balance. The contractor retains the cash payment and discount. He sends the trade acceptance to the bank, which deducts the discount, the service fee, and the 10 per cent. deposit, and sends the proceeds back to the contractor. On the same day, the bank sends a letter, coupon book and full instructions to the customer, who in turn makes his monthly payments to the bank. Thus the customer has the advantage of buying at a cash price on a time payment basis; the contractor obtains all of his money except a 10 per cent. deposit which is refunded at 5 per cent. interest when the customer has made all his payments; and the bank has made a profit on its deal.

What is New in Electrical Equipment

Cuts Down Your Light Bills

Where the price of electric current per kw.h. is a factor of any considerable importance in the sum total of one's monthly bills, the appliance illustrated herewith is of very real value in reducing those bills. This is an appliance which gives a graded amount of light, and, of course, at the same time uses graded amounts of current. By a slight touch of the chain some twenty gradations from full "on" to "out" are obtainable, and though consumption of current is not exactly in proportion to the amount of light given throughout the whole range, the saving is very considerable indeed. The actual facts in connection with consumption and saving, using this device, were recently published by the Bureau of Standards as follows.

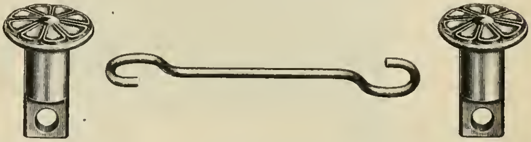


Position	Watts Consumed	Full Watts %	Candle-power	% Full Candle-power
1 ('On')	39.8	100	37.3	100
2	39.2	98.5	34.0	91
3	38.8	97.5	32.3	86.5
4	37.4	94	25.9	69.5
5	35.2	88.5	17.4	46.5
6	30.9	77.5	7.7	20.5
7	27.2	69.5	3.6	9.6
8	26.3	66	2.5	6.7
9	23.6	59	08.5	2.3
10	21.1	55.5	0.7	1.9
11	20.0	50	0.33	0.9
12	19.2	48.5	0.25	0.7
14	16.3	41	Below 0.4	
15-16-17-18	Not Recorded.			
19 ("Out")	9.6	24	Barely Incandescent	

This dimmer, which has been given the trade name of "Anylite," is manufactured by the Anylite Electric Company, Fort Wayne, Ind., and distributed in Canada by the Dominion Battery Co., 736 Dundas St. E., Toronto.

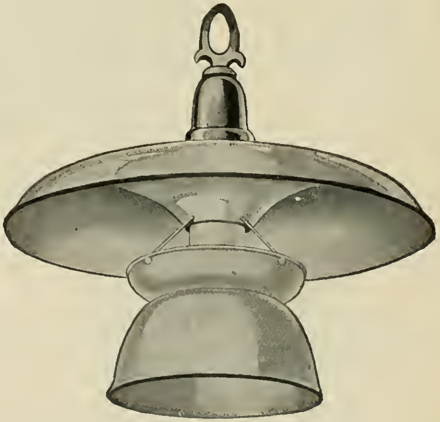
Hangers for Bowl Fixtures

The accompanying illustration shows rosettes and loop designed and placed on the market by the Plume & Atwood Manufacturing Company, Waterbury, Conn., for hanging bowl-type lighting fixtures. The loops are made in 3-in. to 5-in. lengths to accommodate differently sized bowls.



The "Amco" Industrial Unit

An original idea in fixture lighting equipment is shown herewith. The filament in the nitrogen lamp centres at the waist-line of the lower member—the exact focal point of the lower bowl—which causes the illumination to stream down upon the work table, lathe, etc., as intensely as if subjected to the headlight of a powerful automobile. The light in the upper hemisphere of the filament which is more or less lost in the holder of the ordinary reflector equipment, is reflected outwards by the upper member to illuminate the vertical plane. This gives the result of two lights in one. Being so designed and of all-porcelain enamelled steel, there is no possibility of misplaced light or glare.



The distribution of this equipment in Canada is in charge of Mr. Frank T. Groome, room 1710 Royal Bank Building, Toronto. Mr. Groome's intimate knowledge of good lighting and good lighting equipment is well recognized and will establish confidence in this new line.

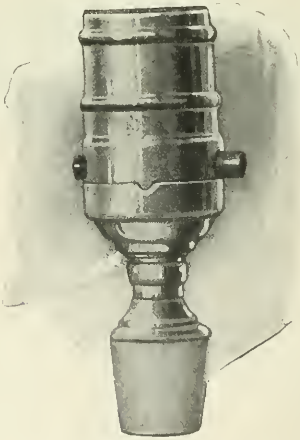
The S. Morgan Smith Co., York, Pa., have closed a contract for the supply of a 2,000 h.p. horizontal turbine to the Electric Reduction Co., Buckingham, P. Q. This will be direct connected to a generator. The company is adding a new unit to the equipment.

"Equator" Heat

The Equator Manufacturing Company, of Hamilton, Canada, are manufacturing an air heater following the design shown in the accompanying illustration. This particular type of household appliance is finding a very ready sale in the average household where its operation is becoming general during the late autumn, as a means of holding off the date of starting up the troublesome coal furnace. The company also manufacture a useful little toaster which consumes 550 watt hours. It is sturdily built and suitable for use on the table or elsewhere.

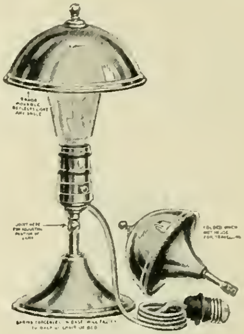
Attachment Used to Electrify Candle Sticks.

William R. Noe & Sons, New York City, have developed a device called the "Lenox" attachment, which is used for the purpose of electrifying candle sticks, so that they can be used as portable lamps. As shown in the accompanying illustration this device consists of a rubber cork mounted on the lower end of a lamp socket. When once inserted in a candle stick this attachment cannot be accidentally pulled out. Turning the device to the right when inserting it causes the rubber cork to expand so that it will fit any candle stick. The metal part of the attachment is furnished in brass or nickel.



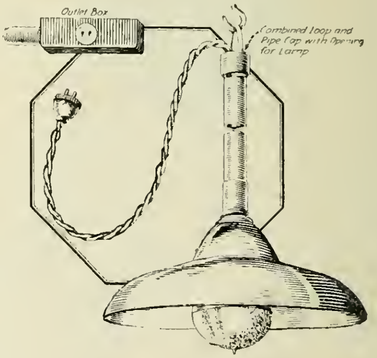
A Lamp that Clamps or Stands Anywhere

In addition to the Polar Cub line, a very attractive device, handled by the Gilbert-Menzies Company, is the Wallace lamp. This is a lamp that will hang or stand in any position with an adjustable feature which enables light to be directed in any required direction.



An Overhead Fixture Where You Want It

The usual form of overhead lighting fixture cannot be readily moved from one position to another; it occasionally conflicts with overhead shafting, machinery, etc., and it does not always give illumination where it is wanted. To avoid these objections, the "Electrical World" describes how one large industrial plant in Connecticut has made its general overhead lighting equipment semi-permanent in position. To do this the conduit supplying the lamps has been run in the usual manner to symmetrically placed outlet boxes, but instead of placing the lamps directly under the outlet boxes, they are suspended from hooks placed at any desired distance from the outlet box and connected therewith by twin-conductor cord and a plug connector. The lamps proper are supported several feet from the ceiling. So as to avoid the objectionable features of drop-lamps, each



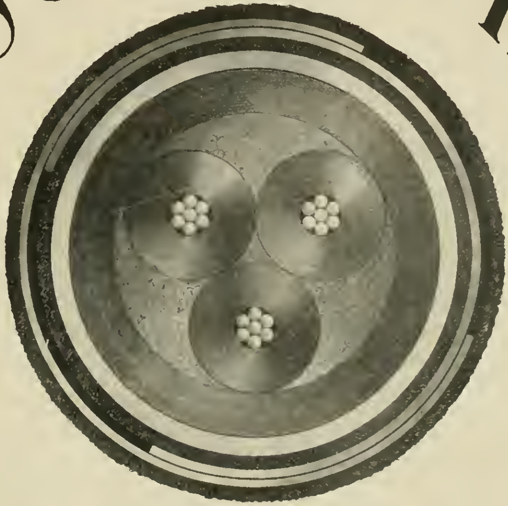
Personals

Mr. J. S. Gould, Smiths Falls, Ont., is the Conservative candidate in South Lanark at the coming provincial election.

Mr. Wills Maclachlan was elected chairman of the Public Utilities Section of the National Safety Council at the recent convention of that body held in Cleveland.

PHILLIPS'

ARMOURED CABLES



No. 2 B. & S. 3-Conductor 25,000 Volt Cable

Paper Insulated, Lead-covered, Double Steel Tape Armoured

Supplied to the Order of

The Quebec Railway, Light, Heat and Power Company

Eugene F. Phillips Electrical Works, Limited

MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary, Vancouver

Society Plans All-Electrical Christmas

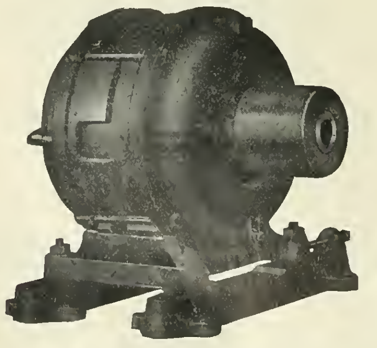
The Society for Electrical Development has announced a campaign to make this an All-Electrical Christmas. Representatives of the Society have just completed covering sixteen States and the Province of Ontario, during which electrical conditions in every branch of the industry were studied at close range. In most cities the contractors, dealers, jobbers and manufacturers reported the greatest volume in their history. Manufacturers and distributors of electrical specialties, particularly, are far behind on orders as dealers in these devices are finding ready sale. As one retailer expressed it: **"For the first time in the history of electrical appliance selling in this city, people are coming into the store to buy large and expensive specialties, which heretofore we had to go out and sell with the hardest kind of selling."**

Based upon this information, the Society has prepared complete and comprehensive sales and advertising material for holiday selling. This material will comprise a beautiful poster in many colors, colored leaflets, envelope enclosures, cards for counters, cars and windows, form letters and various other advertising matter. It is planned to distribute this co-operative help to the trade at large, as in the past Society campaigns. The Society will gladly supply details of the campaign and material upon request.

E. A. Lowry Power Equipment Co.

The E. A. Lowry Power Equipment Company has made application to the Ontario Government for incorporation under the name The E. A. Lowry Power Equipment Co., Ltd. Under the new charter this company will conduct a sales business in all kinds of electrical power equipment machinery, etc. The authorised capital is $50,000 with head office in the Herald Building, Guelph. The old company has been in existence for nearly five years and is now incorporating owing to the large increase in the business, which has become thoroughly established throughout the Dominion. Mr. E. A. Lowry will be president and manager of the new company, and Miss M. M. Malone, secretary

The town of Wolfville, N.S., some time ago purchased the plant and goodwill of the Acadia Electric Light Company. They are now spending $25,000 to provide necessary improvements.



The St. Louis motor, handled by R. E. T. Pringle

Current News and Notes

Carleton Place, Ont.

Mr. G. A. Burgess, of Carleton Place, Ont., has been granted permission to bring electric power from Blakeney to Almonte to operate a flour mill in that town.

Glencoe, Ont.

The ratepayers of Glencoe, Ont., will vote on the question of securing a supply of Hydro-electric power for that village.

Hamilton, Ont.

The Hamilton Lamp Company have commenced manufacturing tungsten lamps at 144-146 York Street, Hamilton. Mr. George F. Webb is at the head of the company which is capitalized at $300,000.

Lakefield, Ont.

The ratepayers of Lakefield, Ont., have passed a by-law authorizing an expenditure of $26,000 for a supply of Hydro power in the village.

Ottawa, Ont.

Acting under the direction of the Water Power Branch of the Department of the Interior, a hydrometric survey staff will be organized and put to work to systematically ascertain the various water power resources of all the provinces of the Dominion. It is understood Mr. Stuart S. Scovill, B.Sc., will be the chief engineer, with Mr. James R. Bissett, B.Sc., as assistant engineer.

Peterboro, Ont.

Work has commenced on the construction of a transmission line from Healey Falls to Peterboro. Norwood and Havelock will be provided with light and power by this branch of the Hydro-electric System, and the farmers in surrounding districts will also be able to take advantage of the line.

St. Thomas, Ont.

The St. Thomas Hydro-electric System have received applications from 168 farmers in the Yarmouth district for Hydro service on their farms. It is expected about 400 h.p. will be required to serve this district. The farmers of Southwold township are also negotiating.

Toronto, Ont.

A start has been made on the construction of a building for the University of Toronto which will house the electrical laboratories and kindred science departments. It will be ready, it is expected, in about a year.

Judge Barron, of Stratford, has been appointed by the Minister of Labor a commissioner under the Inquiries Act for the purpose of investigating the cause of, and placing the responsibility for, the strike of the Toronto Electric Light Company's employees on September 3 last.

Truro, N.S.

Ratepayers of Truro, N.S., have voted an expenditure of $50,000 for the purpose of improving and extending the electric light and power plant.

Uxbridge, Ont.

At a special meeting of the Uxbridge town council recently it was decided to introduce an enabling by-law for Hydro-electric light and power.

Wingham, Ont.

A movement is on foot in Wingham, Ont., to have a by-law passed authorizing the expenditure of $40,000 for building a plant and sub-station to bring hydro-electric power from Eugenia Falls.

Electrical News
Generation, Transmission and Application of Electricity

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Education of Public Only Solution of Electric Railway Difficulties

Considerable space in this issue is given over to papers and reports presented before the recent convention of the American Electric Railway Association in Atlantic City. This convention was of more than usual interest as it seemed to indicate, from the tone of the members' remarks, that a little sunshine is at last breaking through the dense clouds that have enveloped the electric railway business for the past five years.

Briefly stated the situation resolves itself into one of "expediency"—for the companies and the public alike. What is the best thing to do under the circumstances? It is true, of course, that the average railway is tied up by franchise agreements, but what is the use of that if it means a receivership, bankruptcy and a demoralized service? Already the matter has been too long drawn out and the industries of the whole country are suffering. Demagogues are using the situation to gain their own ends—to inflame the passions of the electors against the corporations. The education of the public has been in the wrong hands and along the wrong lines. Those who would teach have themselves failed to learn the lesson that you cannot fatten any industry permanently at the expense of another—and a base industry at that. You cannot build without tools and material. Transportation that is at the same time rapid, comfortable, safe and sanitary lands the worker at the factory fit for his day's work and delivers him again at his home in a fit mood and condition to profit by his period of recreation. A proper transportation system thus adds tremendously to the efficiency of the worker and hence to both the quantity and quality of his production. Thus the cost of the transportation becomes a matter of very secondary importance. The case is so clear and the arguments so convincing that there can be no doubt the public could be brought to see the street railway situation in proper perspective if the politicians would let them do so. Much good has been done by the railway companies in the way of distributing enlightening propaganda but much yet remains to be done. In the meantime it is encouraging to hear the note of optimism running through the various discussions at the recent convention. The public thinks, votes and acts according to the facts at its disposal. Where they are properly informed the public can be depended upon to take the right course. It only remains then to inform them and the onus falls on the railway companies. Rightly or wrongly this is so, for they are the only ones who understand the situation and can state the facts. The education of the public must be pushed forward, therefore, by every possible means as the only solution of the difficulty that threatens to engulf, not only the railways themselves, but the general industries of the Dominion which are very directly dependent upon them.

Says Private Ownership Superiority Demonstrated in World War

E. N. Hurley, who served throughout the war as chairman of the United States Shipping Board, was asked if he would tell what in his job had impressed him most.

"The efficiency of private ownership and operation as compared with public ownership and operation," was the answer, "and I believe this lesson, as it is brought home more emphatically to the American people, is to prove one of the greatest benefits we derived from the war.

"As new facts about the conduct of the war come out, as our experience in many fields of production is appraised, they will point, I predict, more unerringly to this same conclusion—the superior efficiency of private ownership. All production centers on the cost—you can't get away from that. Shift responsibility for the cost, for the best possible result under a given set of circumstances, and you shift the responsibility for efficiency. That is what we did on the Shipping Board, under the pressure of war's necessity, when the question of cost was forced into second place. We shifted this responsibility from private shipbuilding concerns to the Government.

"With the shifting of responsibility of cost to the Government, that keen interest in results which follows private initiative was gone. There you have the whole problem as between public ownership and private ownership stated. No way has been found to instill in public ownership the incentive that possesses private ownership to improve conditions of production.

"The cost-plus-percentage system was a great mistake, and from the start had a bad effect on the workmen and the management. No private concerns could have operated and paid their way on the wages paid under that system. On the basis of cost they could not have borrowed money from the banks. The whole proposition of government ownership is fine in theory; in practice the push of individual energy is missing.

"I don't know of a government-owned plant that produces more than two-thirds efficiency. When the manager has no dividend to strive for when the toll is paid, the slowing up is sure to follow. In the years to come some way may be found to keep incentive to best endeavor in men under government ownership, but until that is discovered that system may be classed as a failure."

Nitrogen Fixation Possibilities Explained at Vancouver Electric Club Luncheon

Utilization of electrical energy in Western Canada for the greater development of that country, was touched upon in an interesting manner by Mr. I. Freeman, formerly chemist of the American Cyanide works at Niagara Falls, in an address he delivered last month at the weekly luncheon of the Vancouver Electrical Club. The attendance was the largest since the club was inaugurated, and the speaker revealed some matters that had not been brought to light since the start of the great war. Mr. Freeman traced the history of the separation of metals by means of electrical energy, from 1807, when Sir Humphrey Davies made the interesting discovery of the separation of metallic sodium, and explained why the delay occurred in the development and carrying on of this process, which, he said, was the non-development of electrical machinery to produce power and transform and transport it.

In 1880 the Niagara Falls first showed any development of electrical power from water, and immediately a separation process sprang into existence. That process was exactly the same as Sir Humphrey Davies had used eighty years before, and it is the one that is in use to-day. That process came from England to Niagara because there was cheap power developed from water which was so necessary in the nitrogen industry. In Canada, said Mr. Freeman, we have the only nitrogen commercial fixation plant in the British Empire. In 1900 the Germans sought to produce a process of fixation. Possibly at that time they thought there would be a great war and that they would be cut off from Chili, which was the source of all nitrates, and this was the case.

In 1900 a group of capitalists in Tennessee became interested in one of the rivers in that state, and arrangements were made for its development. An eminent engineer was sent to Europe to investigate the different processes of nitrogen fixation, and he made his report that the process known as cyanamide was the most suitable for American conditions. The arc process was working successfully in Norway and producing nitric acid, but it required very cheap power to do so.

It was then found there. was an obstacle in the way of developing power on the Tennessee river and that the one place in the world where cheap energy could be secured was at Niagara Falls,, and, as a result, the plant was put in Canada, and the company started operations in 1907. That plant to-day fixes about 12,000 tons of atmospheric nitrogen per annum. The details of the process are more or less confidential, but he could, said Mr. Freeman, give some of them.

The raw materials are carbon, coke, limestone and the atmosphere itself. The coke is carefully dried before being used in the furnaces and the lime is used fresh from the limekilns. These two ingredients are mixed in equal proportions about the size of a chestnut and fed into the electric furnaces. These furnaces are nothing more than rectangular tanks lined with ordinary brick and a carbon bottom. In the bottom is coke, rammed up with pitch. The electric current is applied by means of electrodes which are huge blocks of carbon. The current melts the lime and the coke reduces the lime, takes the oxygen from it and leaves the calcium metal. The calcium combines with the coke and calcium carbide is formed. The temperature is between 2,000 and 3,000 centigrade and, owing to the presence of a small amount of lime in the carbide, the carbide flows very easily.

It is on the ends of the electrodes that the carbide is formed. The carbide can be poured out of the furnace. That operation is on a large scale to-day, and there are furnaces built at Niagara Falls which are taking 12,000 kw. hours each. There were three furnaces built recently of 4,000 kw. capacity each. Two of these furnaces will do the work of nine furnaces which were in operation during the war. The larger the furnace the greater the efficiency.

Mr. Freeman described the process of taking the calcium carbide from the furnace and the distillation of the nitrogen which came out 99.9 per cent. pure. The ground carbide is put into drums four feet in diameter and 8 feet deep. The was was brought in contact with the carbide powder. A carbon pencil is placed in the centre of the cylinder so that it forms the axis of the cylinder and the electric current turned into the pencil. This pencil becomes very hot and the nitrogen combines with the carbide next to the pencil and the result is a reaction takes place which gives off an immense quantity of heat, so that the carbide is also brought to a white heat. That heat is sent on to the next layer of carbide towards the periphery. After a time the current is shut off and the whole mass of carbide is converted to cyanamide.

That contains 20 per cent of its weight in nitrogen. This process, Mr. Freeman explained, of fixing nitrogen by means of carbide, was invented by two Germans, who were after something else, and who came upon it accidentally. During the war Germany produced 600,000 tons of cyanamide. They had it within their boundaries for the production of explosives and, furthermore, they had the means at hand to produce fertilisers for their fields.

Cyanamide was made available long before the war ended and is now available at a price lower than the Germans ever charged.

Mr. Freeman went on to show the derivatives of cyanide, and said that he looked to see the cyanamide process developed in Canada at no distant date to supply fertilisers to the prairies, in a highly concentrated form. He referred to the immense water power in British Columbia and expressed the opinion that there was no reason why that power could not be utilised for the development of electrical energy to supply this fertiliser that was so much required in the middle west to-day. It would be seen from this that the possibilities of electrical energy were amazing.

In reply to questions Mr. Freeman stated that the horsepower at Niagara Falls to-day, which was being used by the American company, was 30,000. He thought carbide could be made in this country if the power were cheaper.

Mr. J. R. Read of the Canadian Westinghouse Manufacturing Company presided and several new members were introduced at the luncheon.

Hamilton Rotarians Visit Power Plant

One hundred and thirty-four members and guests of the Hamilton Rotary Club visited the East End steam power station of the Dominion Power & Transmission Company, Limited, Hamilton, on Thursday, October 16th. The company placed at the disposal of the Rotarians two special Interurban cars which were run over the Radial and the company's private switch to the door of the steam plant. After a thorough and systematic inspection of the plant, following the steam and water routes, the visitors were served with dinner in the turbine room extension. Mr. A. T. Enlow, president of the Rotary Club, presided at the dinner. Mr. W. G. Angus, superintendent of light and power for the company, and who was responsible for the arranging of the outing, gave a short address which was enthusiastically received in true Rotarian style. The trip was an eye opener to those who were fortunate enough to take advantage of it and all were impressed by the orderliness, the extent and completeness of the plant, which, although comparatively quiet, gives one the impression of immense capacity and power.

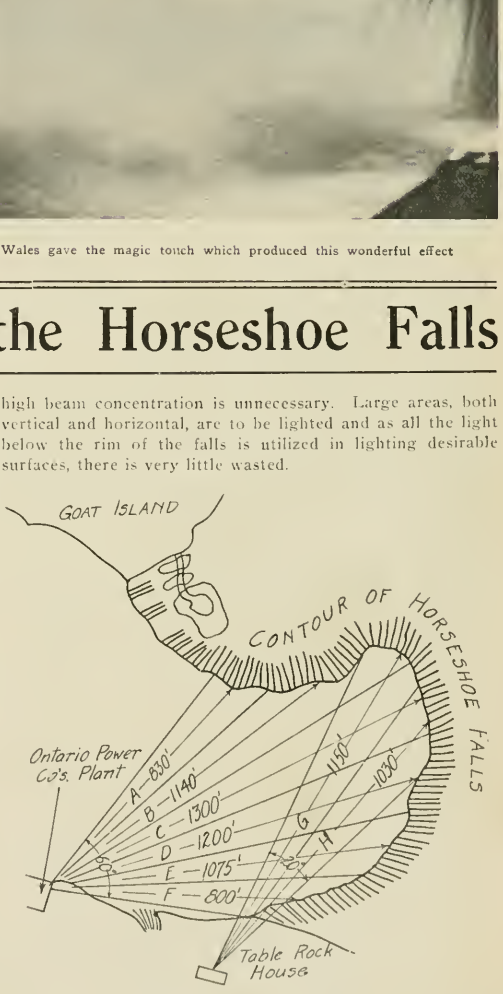
On the occasion of his recent visit to Niagara Falls, Ont., the Prince of Wales gave the magic touch which produced this wonderful effect

Flood Lighting of the Horseshoe Falls

The flood lighting of show places is rapidly gaining ground as a means of extending their attractiveness beyond the hours of daylight and thereby increasing their interest for tourists and residents. The lighting of the Horseshoe Falls at Niagara, where there has recently been installed a flood lighting battery of some ninety-odd 1000-watt lamps on the Canadian side of the river, is an example possessing some interesting features peculiar to itself. The installation was operated for the first time on the occasion of the recent visit of the Prince of Wales to Niagara Falls, the Prince himself officiating at the inaugural ceremonies.

An inspection of the possible locations for the battery resulted in the selection of the corner of the roof of the Ontario Power Company's generating station for the main group of projectors. From this point light can be thrown upon all parts of the falls without the apparatus intruding itself upon the gaze of sightseers during the daytime. Another feature worthy of consideration is that directly beneath the roof is an adequate supply of power. At times, however, the rising cloud of spray conceals the view of the crest of the Falls near the apex of the horseshoe from this location and to offset this a group of ten short-focus projectors was installed on the roof of Table Rock House (see map). By reference to the map it will be seen that the distances are considerably greater than are usually encountered in ordinary flood lighting. The height of the falls is 158 feet and at the longer distances the diameter of the beams is greater than is necessary to cover the face of the falls. In these cases the tops of the beams are trained upon the crest. The diffused light from the main projectors was counted upon to illuminate the water at the foot of the falls.

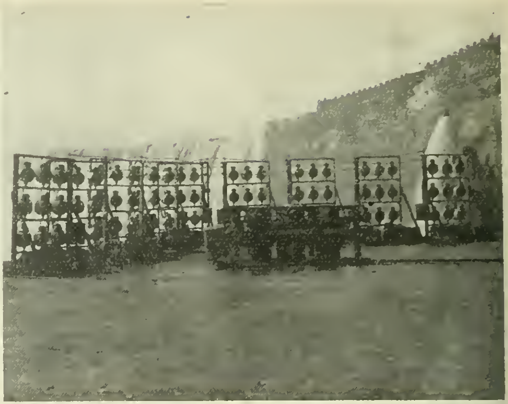
Long-focus projectors, utilizing the regular type gas-filled lamp, were selected for the main group because such lamps are more readily secured and because of the fact that high beam concentration is unnecessary. Large areas, both vertical and horizontal, are to be lighted and as all the light below the rim of the falls is utilized in lighting desirable surfaces, there is very little wasted.



Plan of illumination installation

The main battery placed on the roof the O. P. Co's. plant consists of 81 projectors, each containing one 1000 watt lamp. The battery is divided into 9 banks of 9 units each. Each bank is a complete three-phase unit in itself being equipped

General view of Horseshoe Falls, illuminated. Flood lights seen in right of picture



View, from above, of batteries of projectors grouped on the roof of the O. P. generating station

with a service box containing fuses and switch. All service boxes are enclosed in tight fitting wooden housings as an additional protection against spray. The connections from the sub-feeders to the projector sockets are through flexible conduit securely fastened at each end so that any accumulation of ice will not impose a strain on the wires. Three 30 kw. transformers are located close to the projectors and are connected to the 2200 volt busses in the power house by lead covered cable in conduit. Weatherproof cable is used for low tension feeders.

The effects secured by this installation are dependent to some extent on the spray conditions. At times during the day different parts of the falls are obscured by spray, depending on the direction of the wind. The same conditions of wind and spray are likely to be found at night and no attempt was made to penetrate the spray with artificial light. If such light could be projected through the spray the latter would still obstruct the vision as in daytime—more so in fact. The Table Rock group was therefore installed to light up the crest of the falls as there is a fine view from this point. In the final adjustment of the beams it was found that more of the contour of the falls toward Goat Island could be illuminated than is shown on Fig. 1 and each zone was spread out slightly to accomplish this purpose.

In the final result some unexpected effects were obtained. When approaching the edge of the gorge the illuminated water forming the sides of the basin, viewed against the dark surroundings, gives the impression of a huge, seething cauldron, the ascending spray helping out the effect. Considerable light is reflected from the spray onto the roadway, producing appreciable increase in its illumination. The cloud of spray ascending into the sky radiates a bright glow that can be seen for some distance.

This installation was designed and erected by the Hydro Commission's engineers. The reflectors are X-ray type supplied by Mr. George J. Beattie.

National Electric Light Association Offers Home Study Courses

This is an age of specialization and the demand for specially trained men greatly exceeds the supply. The obvious reason for this is that in the large organizations now engaged in the different branches of the electrical industry in this country the work is necessarily complex, and in order to overcome this complexity and evolve co-ordination out of seeming chaos the work is divided, one set of men doing one thing, another set of men doing another thing, and so on. It is evident, then, that the man with special training in some one thing is the man most sought after.

In the central station industry the National Electric Light Association is answering the question by providing the central station employee with this training, and by so doing, benefiting both the man and the industry. This training is obtained by use of home study courses prepared by specialists and distributed by the National Electric Light Association. An explanation of each follows:

Course in Practical Electricity

This is a course of ten lessons prepared for practical men who are engaged in the central station business, and it covers a selection of subjects which will give the best knowledge of the necessary fundamental principles. The lessons are written without the use of advanced mathematics, and are easily understood by the non-technical man.

Commercial Engineering Course

This course of seventeen lessons is prepared particularly for men who want to learn the commercial side of the business, and it thoroughly and completely covers the selling end of the industry in all its branches. It is practically the only method in print of teaching new employees the business of the central station.

Elementary Accounting Course

This is a mercantile course of seven lessons, covering fully the fundamental principles of bookkeeping and accounting. It is thoroughly equipped with questions and exercises and with all necessary account books, forms, and other material for a thorough elementary course. It has been especially adapted as a preparatory course for the Advanced Course in Electric Utility Accounting.

Advanced Course in Electric Utility Accounting

A highly specialized course in Electric Utility Accounting of 36 lessons, covering all phases and the best modern practices of our most progressive companies. It follows the Association's Classification of Accounts of Public Service Commission requirements, and carries the students from the organization of the company through to the operation of a holding company. Complete with necessary book and special material.

Special booklets on any of the above courses will be sent upon application to Mr. Fred R. Jenkins, 72 West Adams Street, Chicago, Illinois.

Electric Railway Officials are Encouraged

In the Recent Atlantic City Convention of the A.E.R.A. Various Speakers were Optimistic that the Public are Showing a Better Appreciation of the Situation—Extracts from Papers and Reports

One-Man Car Operation in Increasing Favor With Both Public and Officials*

Your committee feels, after its study of the subject, that the topic assigned to it represents the most important improvement in street railway operation that has been brought out in the last decade.

Our investigation indicates that the subject of one-man car operation naturally divides itself into two fundamentally different cases:

1. The mere rearrangement of existing two-man cars so that they can be operated by one man, thus saving platform expense, and, if equipped with safety devices, making an improvement in accident cost.
2. The creation of an entirely new type of car of low weight, greatly improved safety, and more rapid acceleration and deceleration. This car of the light-weight safety type not only saves platform and accident expense, but permits an improvement in service, such as well nigh to revolutionize the street railway business.

The operation of street cars by one trainman in small communities where small gross per car-mile demanded the utmost economy in operating expenses, is not a new idea in the street railway business, the practice having been followed for years by many of the smaller companies; but the modern light safety car represents a radical improvement in the whol art of urban transportation and, therefore, will be the principal topic discussed in our report.

The jitney was what produced the light safety car. The popularity of the jitney proved beyond a possibility of doubt that frequent, quick service would get passenger business away from the slow and infrequent street car, and it was up to the street railway industry to develop light cars that would simulate jitney service. Following this idea, Charles O. Birney designed the car that now bears his name. It was realized that the car must be light in order to accelerate quickly and that it must be operated by one man in order to compete with the jitney which was similarly manned. The safety devices followed from the realization that the public would not patronize the car unless it was convinced that it took no more chances in doing so than with the two-man car.

The new car, weighing only 13,000 lbs. and seating thirty-two people, had to be designed from the bottom up—wheels, axles, truck, body and motors were all radical departures from previous practice and the automatic safety features alone were a triumph of adaptation to the compelling forces which led to the development of the new car. In general, these safety devices consisted of ways to make the operation safe in case the operator dropped dead, or slackened in attention. The "dead man's handle" required that the operator have his hand constantly on the controller or it would throw off the power. Similarly, if the power were so thrown off, the brakes would be automatically applied and sand fed to the track, and, when the car came to a stop, the doors, previously held securely closed by air pressure, are made available for manual operation to form emergency exits if desired.

The committee desires to emphasize the importance of the safety devices in one-man operation. We are advised that practically all of the cases of unfavorable action by the public or public bodies against one-man car operation have been where no safety devices were installed on the cars.

In order to support our own opinions with the largest possible reinforcement of opinions of those engaged in the business, questionnaires were sent out to all member companies. These questionnaires were prepared after a full committee meeting and cover all phases of the subject. The companies replying numbered ninety-three, representing 1,123 one-man cars. It was found, in general, that more than half of the companies reporting were 100 per cent. one-man operated, and that 41 per cent. of all cars of the reporting companies were one-man operated.

The total number of light safety cars in operation in the United States at the present time, allowing for deliveries which will be made up to the time this report is presented, is 1,100. The number under order and in process of manufacture is 600—among the latter an order for 200 for the Brooklyn Rapid Transit Company. The total number of one-man cars, including safety cars, in use in the United States is somewhat more than 2,000.

Replies to Questionnaires

Power Consumption.—Companies using the safety car report an average reduction in energy consumption per car-mile of 51.2 per cent. Taking 3 kw.hr. per car-mile as a fair average for most city systems, this means a saving of about 1.5 kw.-hr. per car-mile. Actual figures from forty-five companies show energy consumption of safety cars ranging from 0.8 to 1.75 kw.-hr. per car-mile as a fair average for most city systems, and this means a saving of about 1.5 kw.-hr. per car-mile.

Trainmen.—Replies showed that the operator of a one-man car was paid more than either trainman in two-man car operation by 62.5 per cent. of the companies answering the question, the range being as follows:

Number of companies	Cents per hour additional
1	1
10	2
5	3
13	4
1	4½
10	5
1	7
1	8
1	7½
1	4
Average	4

As to the feeling of the trainmen toward one-man cars the replies showed:

Favorable	83
Unfavorable	10
Per cent. favorable	89.2

The same ratio was reported as to opposition by trainmen to the inauguration of one-man car operation, the opposition being classified as seven, due to labor union feeling, and three due to apprehensions of the men as to the difficulty of accounting. Only two companies out of forty-five report the trainmen disliking the safety cars.

In answer to the question as to whether or not trainmen had been assured they would not lose their jobs due to the starting of one-man operation, thirty-nine companies reported that they had made this promise, forty-two that they had not.

The Public.—The attitude of the public toward one-man cars when started was reported as friendly by eighty-four and unfriendly by fifteen. This latter number was changed to four after a trial of the cars themselves, thus resulting in a final public verdict of 96 per cent. in favor of the one-man cars.

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*Abstract of Report of A.E.R.A. Safety Car Committee.

The action reported by public bodies toward one-man cars was as follows:

Cases of favorable action by city commissions	10
Cases of favorable action by state utility commissions	11
Instances of defeat of proposed unfavorable state laws	3
Refusal of city council to pass prohibitory bill introduced by labor.	1

Only two unfavorable acts by public bodies were reported, one by a district court and one by a city commission, but in these cases, the safety car was not at issue.

Regarding the question of fare collection with one-man cars replies showed no difficulty or not any change from conditions with two men in eighty-eight cases, and the three companies reporting difficulty said it was only to a limited degree.

Schedules.—The replies to the questions under this heading had to be clearly distinguished as between light-weight safety cars and converted one-man cars, because the latter could not, of course, expect to effect any change from their former schedule.

Regarding headway, the average increase in number of cars operated on lines using safety cars was 43.7 per cent.

Similarly, with schedule speed this was increased an average of 14.76 per cent. with the safety cars, thus making an average increase in car frequency of 58.46 per cent.

As to lay-over time, more was found needed by twelve companies, but no additional needed by seventy-five companies.

As indicating the wide range of adaptability of safety cars, headways from one minute to thirty minutes were reported.

Earnings.—The wonderful success of the safety car in building up traffic was indicated by the answers to these questions. Of course, with converted former two-man cars, no effect in increased earnings was observable. The average for the six companies using safety cars which were the most successful shows the following:

Gross per car-mile before one-man car operation, cents	21.11
Gross per car-mile after one-man car operation, cents	20.65
Decrease in car-mile gross, per cent.	2.3
Increase in car-miles operated, per cent.	53.4
Increase in total gross earnings, per cent.	51.1

In one city of 125,000 population, an increase of 79 per cent. in car mileage on lines where the safety cars were operated producd an increase of 71.2 per cent. in total gross earnings from the lines in question.

The replies as to the effect of light safety cars in eliminating jitney competition do not make a very impressive showing statistically, partly however, because in a large proportion of the companies reporting no such competition existed, but nine companies report complete and two companies partial elimination of this competition through the use of safety cars.

Operating Features.—Various degrees of accident reduction were reported by forty-seven companies and no such effect noticed by twenty-two. It is significant to observe in this connection, that the number of companies operating one-man cars without any safety devices is twenty-four.

On car maintenance, the replies were necessarily inconclusive, due to the comparatively brief time the safety cars have been in operation, but six companies report a reduction of 50 per cent. in car-mile maintenance cost with safety cars and others predict various savings in the future. Naturally no saving in car maintenance can be secured where the former two-man car was simply rearranged for one-man operation.

A saving in the cost of track maintenance was predicted by fifty-two companies. Two large systems advise that they propose a reduction of 20 per cent. to 30 per cent. in rail weight if safety cars are standardized on in the future.

The acceleration of safety cars in miles per hour per second as compared to the average car on the system showed:

Average car	1.67
Safety car	2.53

Regarding flagging railroad crossings, the concensus of opinion appears to be that greater safety is obtained where the responsibility rests on one operator than where, as is the usual practice, it is in effect divided between two trainmen, with the proviso, however, that where the view from the car is obstructed, a flagman is desirable.

Distribution.—That the application of safety cars is not to be restricted to unimportant operation—light traffic lines, etc.—is shown by the following table indicating the use of such cars based upon the population of respective cities.

	One-Man Cars	Safety Cars
25,000	272	27
25,000 to 75,000	422	178
75,000 to 150,000	367	167
Over 150,000	96	59

Conclusions.—The answers to the general question of whether the experience with one-man car operation would lead the company to favor the extension of its use, show the following striking results:

Extension favored by	76
Extension not favored by	2

What Safety Cars Can Show

In order to indicate clearly the effect to be expected from the results already actually obtained by street railway companies, from the use of safety cars, the following typical example has been worked out.

Present Conditions

Length of route, miles	4
Average speed, miles per hour	8
Cars operated	6
Headway, minutes	10
Gross per car-mile (5-cent fare), cents	25

Conditions with Safety Cars

Average speed, miles per hour	9
Cars operated	9
Headway, minutes	6
Increase in car-miles, per cent.	66⅔
Gross per car-mile, cents	24

The safety cars can be purchased on the basis of 20 per cent. cash and the balance in equal monthly instalments with interest at 7 per cent. on deferred payments covering a period of five years. The average annual charge then becomes:

One-fifth of purchase price of $6,000	$1,200
Interest (average per year)	170
Average per year for five years	$1,370

The showing then becomes as follows:

Earnings:

Present 315,210 car-miles per year at 25 cents	$ 78,802.50
Future 525,350 car-miles per year at 24 cents	126,084.00
Increase in gross earnings	47,281.50

Expenses affected by changes:

Annual cost of cars—nine at $1,370	$12,330

Power:
Present: 315,210 x 3 = 945,630 kw.-hr.
Future; 525,350 x 1.5 = 788,025 kw.-hr.
Saving: 157,605 kw.-hr.
At 0.8 cent for fuel = $1,260.84.

Trainmen's wages:

Present: Twelve — eighteen hour men at 45 cents	$97.20
Future: Nine — eighteen hour men at 50 cents	81.00
Daily saving	$16.20

Per year, 365 x $16.20 = $5,913

Accidents:

Present: 5 per cent. of $78,792.50	$3,939.63
Future: 2½ per cent. of $126,084.00	3,152.10
Saving	$787.53

Car maintenance:

Present: 3 cents x 315,210 car-miles	$ 9,456.30
Future; 2.1 x 525,350 car-miles	11,032.35
Increase	$1,576.05
Total increase in operating expenses	$5,944.68

Results

Increase in annual net earnings from the use of safety cars on the line, $41,336.82.

This result is secured:

1. While paying out of operating expense the investment in new cars to do the work.

2. While giving the patrons of the line 66-2/3 per cent. increased car frequency and 12½ per cent. increased speed.

3. Without any allowance for the savings in track maintenance from operating a 13,000-lb. car as against a 35,000-lb. car.

4. While increasing the net earnings per mile of track per year for

the line (estimated as double tracked) by $4,580 or 6 per cent. on a track valuation of $76,500 per mile of single track.

Conclusions and Recommendations

1. The safety car is one of the most important improvements in street railway service that has appeared for many years. Its valuable features in the order of their importance are:

(a) Greatly improved service to the public, both as to frequency and safety.

(b) Increased earnings for the company.

(c) Decreased operating expenses.

2. One-man operation alone, while useful in saving platform expense in the smaller communities is not comparable with the improved service that can be obtained with the light-weight safety car with its more frequent headway and greater average speed.

3. The savings obtainable from one-man cars should be shared with the trainmen in the form of higher hourly rate for the operators of such cars than is paid to the trainmen on two-man cars.

4. When inaugurating one-man car service, it is good policy to assure the trainmen that no one will lose his job due to putting in the new cars. They are installed, as a rule, a line at a time, and experience has proved that the company is not burdened with extra men through this policy.

5. From the nature of the traffic available, the safety cars can accomplish more in a large city than in a small one, for the reason that the possibilities of increasing riding in the small community are limited. This statement is made to correct the erroneous impression existing in some minds that the safety car is useful only for saving expense in the smaller cities.

6. Where traffic is believed to be too heavy on peak to be successfully handled by safety cars, the larger, heavy cars may be used for tripper service on peak, thus making the light cars handle the long hour runs.

7. Similarly, where snow storms require the use of the heavier equipment at rare intervals, the safety cars can still be used to advantage during other times.

8. The safety car, though light, is just as substantial and with the same care in maintenance should last just as long as the former types of car. It has a steel frame and thoroughly modern, ventilated, interpole motors.

9. Regarding the matter of standardization, your committee was not unanimous, but the majority opinion favored adhering to the present standard design of the safety car in the interest of cheaper costs through quantity production.

10. Experience has shown that the overwhelming majority of both riding public and trainmen favor the one-man safety car; that it can, at one and the same time, improve the public's service, increase the trainmen's wages and raise the company's profits; that it can be purchased without financing and operated for about half the cost of an ordinary car; and that most of the companies that have tried it want more. We predict an increasing rapid extension of the use of a device that can make a showing like the above.

Relationship of Items of Cost Under Pre-War Conditions and To-day

By Mr. F. W. Doolittle*

The fact of high prices is one that does not need to be dwelt upon for emphasis to-day. With exceptions so few as to be negligible, prices to-day are so much higher than those existing in 1914 that all industry has found it necessary to rearrange the budget of revenues and expenditures in order to continue in existence. Probably no single fact of recent history has been discussed so fully, and with all so ineffectually, as the high cost of living. These high costs are both a cause and an effect. High prices for food and clothing, for rents and service, bring about increased wages, and these increased wages in turn make the cost of food and clothing and all other commodities into which wages enter, higher than before.

The electric railway industry has been before the public with a schedule of increased costs of labor and materials, continuously during the past three years, and in many instances, the revenue of the companies has been increased substantially because those in authority have realized that the increased costs must be met if service was to be continued. That continuity of service is the persuasive reason for granting relief, appears to be a fair conclusion, because public authorities have generally permitted such increase in revenues as would tend to provide the companies with funds to meet increased wages, increased cost of power and increased cost of materials and have stopped there. Very little consideration has been given the increased cost of money, for the money which is already invested must stay in the industry, and the new money necessary to permit the industry to expand and serve prosperous and growing communities is a requirement relatively remote in the minds of public regulators. Consequently, relief has not been granted to the extent that the company might compete in the open market for funds with which to extend its service to meet the expanding needs of the communities they serve.

It may be urged that it is idle in view of the general consciousness of high price levels to discuss their cause, yet the persistence of high costs is a matter of great importance. It has been said, and not infrequently, that existing high costs are temporary and that the industry should bear the burden during the few years when these costs will obtain. It would be a rash individual indeed, who would publicly announce his convictions that costs would never be lower, yet it is the opinion of many who have given this matter careful thought that the present high prices are likely to remain for many years, because the process of fattening the anemic dollar is one which cannot be hastened and which is beset with difficulties, the full extent of which is realized. If the present high costs are but a matter of a few months, the problem of maintaining the solvency of the industry is far different than it must be if lower prices are to be experienced only after a considerable period of years.

Increase in costs, while much accelerated of late, have been in process before the war, as pointed out in the studies on cost of service made for the Bureau of Fare Research of the association in 1914. Since 1914 material prices have approximately doubled. The average wages which sustained the noteworthy increase of from $627 to $711 from 1902 to 1912, reached $906 according to the 1917 census figures, climbed over $1,100 since, and the ultimate aim of labor, as disclosed by the testimony before the Federal Electric Railways Commission, contemplated a minimum standard of $2,000, based on present conditions of cost of living.

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*Milwaukee Electric Railway & Light Company.

From a review of the historical facts as to gold production, commodity production, changes in currency, and particularly as to the effect of wars upon prices, the conclusion is indicated that the future trend of prices will continue upon the present high level for some time. This conclusion is inevitable whether the reasoning is based upon the quantity theory of money or whether it proceeds upon other ground. The minimum period assigned during which prices will continue abnormal varies from five to ten years. This general conclusion as to future price trends must be recognized in regulating the future service rates of public service companies. Wage rates and the cost of materials will continue on a high level. This will affect the current expenditures for operation and for reconstruction, while extensions and additions to fixed plant, deferred on account of the war, must be financed on the basis of high prices.

To supply adequate credit for these future operations and at the same time to preserve the public confidence in the security of past investments, regulatory authorities must recognize the higher level of prices. Security of investment and a commensurately increased rate of return should be the fixed points toward which rate regulations must aim if the development of public service enterprises is to be placed and kept on a parity with that of other industrial undertakings.

Comparison of Costs on Hypothetical Railway

The preceding rather general discussion may well be supplemented by figures indicating in a general way the magnitude of the problem of those who are charged with the duty of continuing to render street railway service under the conditions of private operation regulated by government authority. The method to be followed will be a comparison of present-day costs of operation with those existing in 1914, through the method of applying 1919 prices to the quantities both of labor and materials purchased in 1914. There has, therefore, been assumed a hypothetical property which in 1914 carried 100,000,000 passengers for a revenue of $5,000,000. This company had 185 miles of line, practically all of it double tracked, and 625 cars, including the reserve equipment necessary to permit periodic shopping. These cars made during the year 1914, 17,500,000 miles in a little less than 1,900,000 hours, or at an average speed of a little less than 9½ m.p.h. The operating expenses of this company in 1914, including $500,000, or 2 per cent. on the cost of its property set aside for depreciation, amounted to $3,750,000, and there was available for return on investment in the property $1,250,000, or 5 per cent. on a total cost of property of $25,000,000.

An analysis was made of the 1914 operating expenses of this hypothetical company, and each class of labor and kind of material has been separated and classified. The resulting comparative condensed income account is shown in Table I.

Table I.—Condensed Income Account—Standard Classification

	1914		1919	
Operating revenue		$5,000,000		$5,000,000
Operating expenses (including replacement insurance)*		3,750,000		6,163,000
Maintenance of way and tructures	$575,000		$875,900	
Maintenance of equipment..	575,000		970,300	
Power	615,000		1,149,000	
Conducting transportation	1,225,000		2,225,000	
General and miscellaneous	385,000		492,800	
Taxes	375,000		450,000	
Net operating revenues		$1,250,000		$1,163,000†
*Maintenance of way and structures				$320,000
Maintenance of equipment..				110,000
Power				70,000
†Deficit				

Each type of labor and each of the principal items of material was increased in the percentage that prices current in the latter part of this year bear to prices which were current during 1914. Use has been made of index numbers, of the records of several of the larger companies, and particularly of information compiled by this association, to determine a fair average increase by types of labor and types of material during the past five years. The operating expenses, which were $3,750,000 for this hypothetical company, in 1914, would amount to-day to $6,163,000, or an increase of 64 per cent. This increase has been far from uniform, being least in general and overhead expenditures and highest in those expenditures which involve the maintenance of track and buildings, particularly the former. This is undoubtedly accounted for by the large increase in the cost of lumber products and manufactured metals with the fact that common labor has generally shown a higher percentage of increase than that which has been gained by the skilled and semi-skilled classes. Through organization, skilled labor has been able to effect an artificial scarcity, and early gained wage increase by this method. To-day there is a shortage of unskilled labor far more acute than any artificial shortage of skilled labor which has been produced in the past.

Table II.—Condensed Income Account—Functional Classification

	1914		1919	
Operating revenue..		$5,000,000		$5,000,000
Operating expenses (including replacement insurance)*		3,750,000		6,163,000
Costs varying with car-hour....	$1,125,750		$2,049,050	
Costs varying with car-mile ..	876,950		1,482,720	
Costs varying with mile of single track..	150,000		312,620	
Cost varying with number of passengers	332,800		486,490	
Costs of electrical energy (car mile)	472,500		930,100	
Administrative and overhead expense burden	417,000		452,020	
Taxes..	375,000		450,000	
Net operating revenues		$1,250,000		$1,163,000†
*Cost varying with car-mile				$210,000
Administration and overhead expense burden				290,000
†Deficit.				

This hypothetical company, then, which had $1,250,000 available for return on investment, in 1914, would, under present conditions, find itself failing to meet operating expenses by $1,163,000. This would, of course, quickly result in insolvency, and many companies have already reached that stage. That some have not is accounted for by increased earnings without proportionately increased costs and by certain lessenings of expenditure, some of which are due to increased efficiency, but many of which can in no wise be termed economy. In such cases maintenance programs have been cut and depreciation reserves are being omitted for the purpose of meeting current operating deficits.

Following the practices outlined in "Costs of Urban Transportation Service," the detailed operating expenses have been separated into those varying with the different statistical units and the results disclosed in Table II. This separation is that now customarily employed in the analysis of electric railway operation.

The derived unit costs of operation may then be directly compared as shown in Table III.

Effect of Increased Business

It is of interest to carry the calculations a little farther in an effort to see what effect a possible increase in business and betterment of traffic conditions have on the deficit in net operating revenue. Let us assume first an increase of 20 per cent. in the volume of business during five years, and then make the further assumption that this 20 per cent. increase in traffic can be carried without departing from prior standards of loading by means of an increase of 10 per cent. in the car-miles operated. By intensive study and constant watchfulness on the part of the transportation

Table III.—Costs Per Unit

Operating expenses (including replacement insurance)

		1914	1919
Costs varying with car-hour		$0.60	$1.09
Costs varying with car-mile		.05	.085
Costs varying with mile of single track		400.00	835.00
Costs varying with number of passengers		.33	.49
Costs of electrical energy (car-mile)		.027	.053
Administrative and overhead expense burden	per cent.	26.8	17.1
Taxes			

department, the average speed has been increased to 10¼ m. p. h., and the number of car-hours operated is therefore the same as in 1914. Under conditions above described 20 per cent. more passengers would produce on the 1914 rates of fare $1,000,000 in revenue and occasion operating expenses of a little less than $400,000, so that the deficit from operation is reduced from $1,163,000 to $560,000. Assuming further that the amount available for return on investment is held at the amount earned in 1914, the company must have $1,685,000 additional revenue or unit revenues of a little less than 7 cents per passenger. Nor will such revenue as this be long sufficient if the community is growing and has need for additional investment in its transportation facilities. A reasonable return on the investment, which in the light of present financial conditions must be placed at not less than 8 per cent., necessitates the addition of another 3/4 cent on the fare of each revenue passenger. These computations take no account of the very serious matter of decreased riding following upon increased fares, but it is evident that if there is any serious reduction in volume of traffic the fare must approach 10 cents per passenger, which is about the figure one would expect would result from the approximate doubling in price of most of the articles entering into the rendering of service and the failure of the industry to earn a reasonable return in 1914.

Movement Charges Increased More Rapidly Than Terminal Charges

The preceding discussion has concerned itself with flat rates of fares. When an analysis is made with terminal and movement expenses, such as is necessary in determining the costs of operation under a zone system of fares, it is noted that movement costs have increased at a far greater rate than terminal costs. The detailed analysis indicates that with terminal or fixed expenses increasing 12 per cent., because of increased costs of operation, movement expenses have increased 82 per cent. This is due to the fact that movement expenses consist principally of those varying with the car hour, comprising platform labor. Assuming an average length of ride of 2 miles, 2¼ cents represented in 1914 those costs which would be independent of the length of ride, while passenger-miles costs would be 1½ cents. On the basis of 1919 costs with no increased traffic the terminal costs would be increased to 2½ cents per passenger-mile, while movement costs would be increased a full cent per mile traveled. This indicates that the increases in platform costs are increasing the discrimination between long and short-haul riders which existed under 1914 conditions. Increases in the labor item are making long-haul traffic increasingly unremunerative. The conclusions which have been reached in previous studies, therefore, as to the paying haul for a single fare and the analysis of the cost components underlying the zone system of fares must be greatly modified because of the effect of increased wages.

Reference should also be made as to the influence of the increased costs noted upon the computations previously made of the cost of complying with standards of service. In the studies previously made under this title for the association, it was pointed out that with a typical distribution of costs, an increase of 10 per cent in the car-hours furnished during the period from 6 to 8 a.m., and from 5 to 7 p.m., platform labor would be increased 3.88 per cent; carhouse handlings 13.27 per cent., while power plant and car investment would be increased 10 per cent. Because of the large element of stand-by charge in the cost of furnishing service during rush hours there is not a corresponding increase in the labor component, as there would be if labor were under all conditions provided at a fixed rate per car-hour. It is necessary to consider, however, the very important influence of the minimum wage and the requirements of time and one-half for overtime in computing the costs of such added rush-hour service.

Conclusions Stated

1. The tendencies towards higher cost of operation noted in studies made prior to 1914 have developed into revolutionary changes in price levels.

2. It is believed that these changes are permanent rather than transitory or temporary in character, and affect all components of the cost of service, including return upon the investment.

3. The analysis of cost of service made for a typical property indicates that the increases in fundamental costs incurred can only be partially offset under the most favorable and economical conditions of handling traffic.

4. Because of the large influence of the cost of platform labor, the new level of costs result in far greater increases in those costs which vary with the miles traveled per passenger than in those costs which are fixed in their nature irrespective of the length of haul. This indicates that the discrimination which has always existed between long-haul and short-haul passengers is constantly becoming greater and that our previous ideas of the cost components in a zone system of fares must be modified.

5. The increased cost occasioned in complying with higher standards of service during rush hours is vitally affected by the recent additions to costs of labor arising out of the application of the minimum wage and the provision of higher unit pay for overtime work.

Seven Cent Fare for Montreal Tramways

The Quebec Public Utilities Commission have retained the 7c straight fare recently decided on by the Montreal Tramways Commission, but have modified other parts of the schedule issued by the Commission. Instead of 4 tickets for 25c the Utilities Commission have ordered 5 for 30c, and 44 for $2.50. The workmen's tickets of 5 for 25c, have been abolished. Neither the city nor the company was satisfied with the decision of the Tramways Commission and as the result of appeals to the Public Utilities Commission, the new fares as outlined have been ordered. After the evidence of Mr. J. R. Bibbins, of Chicago, who was engaged by the city to investigate conditions, the case for the city fell down, and the City Attorney then asked that the decision of the Tramways Commission be upheld. The appeal of the company was mainly on the ground that the estimates of the Tramways Commission were insufficient to meet the obligations. The Public Utilities Commission, in their judgment, examined each main item in detail, and came to the conclusion that the company's contention in the matter of maintenance and renewals is justified, and consequently the sum of $248,326 is added to that amount.

The Commission was supplied with a long list of cities in which fare increases have occurred, most of them in 1918 "Comparing rates in places of similar size and importance to Montreal the tariff we have adopted can by no means be considered burdensome. Also when we take into account the capital cost involved and the operating conditions in Montreal, also the present condition of the system, the outlay in operation and maintenance are far more excessive."

Montreal Tramways Cost-of-Service Plan

By Mr. J. E. Hutcheson[*]

In 1916 the Montreal Tramways possessed on the Island of Montreal, under its name or under the names of the companies absorbed by it, franchises in thirty municipalities; twenty-seven of which were exclusive; twenty-three, terminable between the years 1922 and 1961, and seven, interminable. The contract with the city of Montreal as it existed in 1892 was of thirty years duration, expiring in 1922. The company's system was operating under fourteen municipal councils.

The consideration for the use of the streets in the city of Montreal was an annual payment on the basis of a percentage of the gross earnings which applied only to the revenue from operating within the city limits as they existed in 1892. The tariffs, with free transfers, in each municipality were fixed for the duration of the respective contracts. In 1916 the average fare per revenue passenger on the entire system was 4.12 cents, and for total passengers 3.04 cents.

From time to time, during several years prior to 1917, the city requested the company to make extensions of tracks in municipalities which had been annexed. While admitting that in certain sections there was need of further service the company maintained that the city of Montreal could order extensions beyond the contract requirements in the areas annexed only by making a new contract covering such annexed areas.

This led to negotiations between the city and the company. No progress was made until the Provincial Legislature, in 1917, passed an act creating a commission of five prominent citizens of Montreal to prepare a contract that would safeguard the interest of the citizens and the shareholders of the company; such contract to become law when signed by the members of the commission and the company, and ratified by the Legislature.

After thoroughly studying the matter the commission unanimously concluded that a form of service-at-cost plan was the only equitable basis upon which a street railway franchise should be made. The company agreed to negotiate on this basis, and finally on Jan. 28, 1918, a contract for a period of thirty-five years, covering the company's entire system was signed by the officials of the company and the commission. This was ratified by the Provincial Legislature on Feb. 9, 1918.

The new contract provides for the "Montreal Tramways Commission," consisting of three members appointed by the Lieutenant-Governor in Council, to serve for ten years. This commission has control of the service—may fix the speed of cars; may establish routes, stopping and transfer points; may fix passenger density per car-mile; may stipulate types of rolling stock and of track construction; must approve of all renewals and extraordinary maintenance expenditures, and is empowered to examine and audit all receipts and disbursements. The necessary expenses incurred by the commission in the performance of its duties are to be paid by the company and form part of the operating expenses.

Any party in the case may appeal to the Quebec Public Utilities Commission from any decision of the commission on any question of law or jurisdiction relative to the contract, as well as from any decision rendered by the commission relative to the provisions of the contract. Such appeal shall be final, except on questions of law.

The act provided that the Montreal Commission should make the tariffs uniform for the territory comprising the city and the five municipalities within the city limits; such territory to be known as the "uniform tariff territory." Outside this territory the commission may fix different rates providing that these do not unjustly burden the rest of the system, and providing further that the municipalities outside the territory may, with the consent of the commission, agree to pay the company any part of the excess of their respective services for the purpose of obtaining lower rates.

Guarantee Fund is Provided

The company by yearly installments of not less than $100,000 is to provide out of its own resources a special fund of $500,000 to be known as the "guarantee fund," to be used to meet all liabilities and other debts (except mortgage debts) incurred by the company, prior to the coming into force of the contract, through the operation of its system, and to provide for the payment in each year of any portion of excess expenditure as hereinafter defined, which shall be found by the commission to have been unnecessary for the payment of penalties imposed upon the company, and also to guarantee fulfillment by the company of all obligations assumed by it. This fund when created is to be maintained by the company at $500,000.

The gross revenues of the company are to be disposed of for the following purposes and in the following order: (2) Maintenance and renewals fund; (3) Return on capital value; (4) City Rentals; (5) Contingent reserve fund; (6) Division of surplus.

The commission for the first year of operation is to allow the company out of gross revenues a sum for each revenue car-mile, under certain specifications as an operating allowance. The company is so to increase the transportation service, under the direction of the commission, that the permissible average density of traffic per car-mile, during the first year of operation under this contract, shall not be excessive. Thereafter the commission is to redetermine and fix annually the amount of operating allowance and permissible average car-mile density, based upon the experience of the preceding year.

Company is Allowed an Operating Profit

If at the end of any year the commission shall find that the company has kept within 2½ per cent. of the operating allowance the company may take out of gross revenues a sum to be known as the "operating profit," which shall be equivalent to one-eighth of 1 per cent. on the total average capital value for that year. Any excess over the above expenditure is to be known as the "excess expenditure," which is to be taken from the gross revenues to an amount not exceeding one-eight of 1 per cent. on the average capital value for such year, and the operating profit shall be reduced accordingly. And if the excess expenditure shall exceed this amount the company shall receive no operating profit, but shall pay such excess out of the guarantee fund, unless the company shall have been able to convince the commission that the excess expenditure was unavoidable. Then the commission is to permit the company to take out of gross revenues the additional amount required to cover such excess expenditures and also award the company the full amount of the operating profit less any part of such excess expenditures which may be found to have been unnecessary. If the unnecessary part exceeds the amount of the profit, the balance is to be paid by the company out of the guarantee fund.

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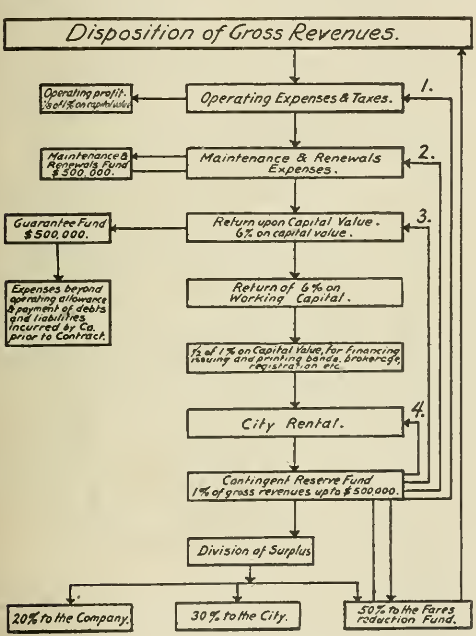
[*] General Manager Montreal Tramways.

For the purpose of maintenance, renewals, etc., a "maintenance allowance" per car-mile is to be placed in a "maintenance and renewals fund." The allowance is to be adjusted annually so as to maintain the fund at $500,000.

Return on Capital Value is Set at Six Per Cent. in Normal Times

The capital value of the tramways system is fixed at $36,286,295, including all physical assets added to the system up to Dec. 31, 1917. As its usual return upon capital value so fixed, the company is to receive in quarterly payments out of gross revenues a sum equal to 6 per cent. on such capital value. From time to time hereafter as money is needed for betterments, additions to and extensions of plant, required by this contract or approved by the commission, such money, except to the extent that monies for such purposes are payable at the time from the maintenance and renewals fund, are to be supplied by the company, and the amounts so supplied and actually expended for such purposes under the supervision of the commission shall, plus net interest expenses during construction, be added to capital value, and the company is to receive out of gross revenues an annual return of 6 per cent. on such amount.


Disposition of Gross Revenues.
Operating profit. ⅛ of 1% on capital value
Operating Expenses & Taxes.
1.
Maintenance & Renewals Fund $500,000.
Maintenance & Renewals Expenses.
2.
Guarantee Fund $500,000.
Return upon Capital Value. 6% on capital value.
3.
Expenses beyond operating allowance & payment of debts and liabilities incurred by Co. prior to Contract.
Return of 6% on Working Capital.
½ of 1% on Capital Value, for financing issuing and printing bonds. brokerage, registration etc.
City Rental.
4.
Contingent Reserve Fund 1% of gross revenues up to $500,000.
Division of Surplus
20% to the Company.
30% to the City.
50% to the Fares reduction Fund.

Montreal Tramways Cost-of-Service Plan

As the capital established at the sum of $36,286,295 does not include any working capital, it is agreed that any working capital required shall be furnished by the company, and upon this working capital the company shall receive a return of 6 per cent.

For the purpose of covering the expense to be incurred by the company in procuring additional capital it shall out of gross revenues receive annually an amount equivalent to one-half of 1 per cent. of $36,286,295, for discounts, commissions, printing and engraving, exchange, legal and other expenses incidental thereto when issuing bonds or debenture stock and for printing and engraving, transfer and registration fees and listing on stock exchange when issuing stock.

The city is to receive out of gross revenues, over and above all other amounts to which it may be entitled under the contract, or otherwise, the sum of $500,000 per annum payable quarterly.

Other Financial Considerations

One per cent. of the gross revenue is to be paid annually into a contingent reserve fund, until this fund amounts to $500,000. This fund is to be used whenever it shall be necessary to make up any deficiency in the payments listed earlier in the order of priority therein established. Upon the termination of the contract, the company shall repay any monies borrowed from the fund and the total amount then in said fund shall be distributed as follows: to the city, 30 per cent.; to the company, 20 per cent., and to a "tolls reduction fund," 50 per cent.

All the portion of the gross revenue remaining after the payment of the charges described is to constitute the divisible surplus and is, at the end of each year, to be distributed as follows: to the city 30 per cent.; to the company 20 per cent., and to the tolls reduction fund, 50 per cent. The tolls reduction fund is to be held in trust for the patrons of the company for the reduction of tolls, and administered by the commission.

Provision for Reduction in Fares

Whenever at the end of any year the amount in the tolls reduction fund exceeds $1,000,000 the commission may, and whenever the amount in said fund shall exceed $3,500,000 the commission shall, reduce the fares or tolls of the tramways system. For this purpose of effecting said reduction, an amount not exceeding 25 per cent. of the total amount in such fund, at the close of the year preceding the year when such reduction is to be made, is to be taken out of the tolls reduction fund, and added to gross revenues, and the commission thereupon is to reduce the tolls to an extent that, in the aggregate for the year, is at least equal to the amount so taken out of the tolls reduction fund, but does not exceed such amount, plus 75 per cent. of the amount which during the last preceding year flowed from gross revenues into the divisible surplus. Thereafter, at the beginning of each year, an amount shall be taken from the tolls reduction fund and turned into gross revenues equal to the amount so taken from said fund at the time of the reduction of tolls; but when the total amount remaining in said tolls reduction fund at the end of any year is less than the amount taken annually from such fund for the increase of gross revenues as above provided, the appropriation from such fund to gross revenues shall for the time being be discontinued, but the tolls shall remain as previously reduced until it shall be necessary as hereinafter provided to increase them.

If the tolls reduction fund, in spite of its depletion for such reduction in tolls, shall again increase to an amount in excess of $2,500,000, the tolls shall be further reduced.

If in any year the gross revenue shall be insufficient to provide for the payment of all sums mentioned, and if the contingent reserve fund is less than $300,000, the commission shall forthwith from any monies in the tolls reduction fund appropriate the amount necessary to bring the contingent reserve fund up to $500,000. If there is not sufficient money in the tolls reduction fund, the commission is forthwith to increase the tolls to the extent necessary to provide at least sufficient gross revenues to meet all the payments described earlier.

At the termination of the contract the tolls reduction fund is to be the property of the city.

The Application of the Contract Provisions in Practice

In conformity with the provisions of the contract the Tramways Commission on June 24, 1918, set the rates of fares as follows:

1. From midnight to 5 a.m., 15 cents.
2. From 5 a.m. to midnight, 6 cents cash or five tickets for 25 cents.
3. For school children from five to sixteen years of age, on week days and between the hours of 8 a.m. and 6 p.m., seven tickets for 25 cents.
4. Transfers shall be issued free to school children specified above, and to all passengers travelling on cars between 5 a.m. and 8 a.m. on week days only. At all other times a transfer shall be issued to any passenger paying his or her regular fare at a charge of 1 cent.

The car-mile allowance for the first period of operation under the new contract was set as follows:

Operating expenses and taxes—22 cents per car-mile for cars equipped with motors, and 15 cents per car-mile for trailers.

Maintenance and renewals—7.9 cents per car-mile for cars equipped with motors, and 5.2 cents per car-mile for trailers.

This decision was appealed and the Quebec Public Utilities Commission rendered its decision on Sept. 20, 1918, fixing the rates as follows:

1. Day tariff, 6 cents or a ticket sold at the rate of five for 25 cents.
2. School children, a ticket to be sold at the rate of seven for 25 cents.
3. Special day tariff of a ticket to be sold at the rate of six for 25 cents, to be good only between the hours of 6 and 8 a.m., and 5 and 7 p.m. on week days only.
4. Night tariff, 15 cents cash.

Each passenger paying a fare shall be entitled to a transfer free of charge.

As the Quebec Public Utilities Commission did not fix any allowances per car-mile for the expenses of operation as provided for in the contract, the Tramways Commission on Oct. 2, 1918, fixed these as follows:

Operating expenses and taxes—20.1 cents per car-mile for cars equipped with motors, and 13.7 cents per car-mile for trailers.

Maintenance and renewals—7.33 cents per car-mile for cars equipped with motors, and 4.8 cents for trailers.

This gave an average allowance per car-mile for operating expenses and taxes of 19.93 cents and for maintenance and renewals of 7.26 cents.

The actual costs for the twelve months ending June 30, 1919, were, for operating expenses and taxes, 21.74 cents, and for maintenance and renewals, 7.26 cents. As the company justified before the commission the over expenditures made during the year, the actual cost per car-mile was allowed.

The company did not receive the full benefit of the increased rates of fare during the year, as they only became effective from Oct. 3, 1918. The average fare per revenue passenger increased from 4.1 cents to 4.8 cents after the new rates came into force.

For the year ending June 30, 1920, the Tramways Commission by its decision rendered on Aug. 29, 1919, fixed the rates of fare as follows:

1. Day tariff—from 5 a.m. to midnight 7 cents cash, or a ticket to be sold in series of four for 25 cents.
2. Special day tariff—tickets to be sold in series of five for 25 cents, to be good only between 6 and 8 a.m. and 5 and 7 p.m., on week days only.
3. The present outside night tariff and school children's tariff to remain in force.

The car-mile allowances are as follows:

Operating expenses and taxes—24.7 cents per car-mile for cars equipped with motors, and 17.4 cents per car-mile for trailers.

Maintenance and renewals—8.54 cents per car-mile for cars equipped with motors, and 7.05 cents per car-mile for trailers.

The above decision was appealed against by the city as being too high and by the company as being too low. Experts from the office of Bion J. Arnold, engaged by the city, were heard and they supported the company's figures. Arguments by counsel for both sides closed on Oct. 2, and judgment will be rendered in the near future, which I feel sure will not be more unfavorable to the company than to confirm the Tramways Commission decision of Aug. 29.

The Prospects of Railroad Electrification In America and Abroad

By Mr. F. H. Shepard*

The world-wide shortage of coal during the great war has emphasized more clearly than ever the necessity of fuel economy in industry, while the present shortage of labor and the certainty of its continuing scarcity throughout the construction period forms another most serious problem. But fortunately we have at our disposal a means that will greatly assist in alleviating both of these conditions; namely—electrification.

The use of electricity in industry saves both fuel and labor. This fact is recognized throughout the world today and in order to secure these advantages, practically all of the nations are now considering plans for the electric generation of power. In England, Belgium and France, among others, these plans are being prepared by official commissions, so that a tremendous activity in electrical power development may be expected with the stabilization following the advent of peace. In all cases, the ideal in view is a broad one: To use electricity for all possible power purposes, including railroad operation.

The operation of the railroads will naturally form an important part of any program of general electrification, for in almost every country the railroads form one of the largest users of fuel and labor. Nor are the advantages obtained from railroad electrification limited solely to economy in fuel consumption and the more effective use of labor. Among others, the following can be mentioned:

1. Greater speed of movement for the heaviest trains, due to the fact that electric locomotives can be made much more powerful than the largest steam locomotives.
2. Greater nicety of control.
3. Increased traffic capacity of existing tracks, terminals, grades, tunnels, and other points of traffic restriction, because when electricity is used, heavier trains can be

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*Director of Heavy Traction, Westinghouse Electric & Mfg. Co.

operated at higher speeds and less time is consumed at terminals and in yards.

4. Operation where the use of steam is impossible or objectionable, as in long tunnels.

5. Independence of weather conditions, since the electric locomotive is not effected by cold weather.

6. More reliable operation, as proved by the statistics of all existing electrifications.

7. More effective use of all rolling stock, due to more expeditious movement of traffic.

8. These are some of the advantages that are now being obtained for the mere substitution of the electric locomotive for the steam locomotive, but they by no means tell the whole story.

Consider electric illumination. When first introduced, the electric lamp supplanted a gas or an oil light because of certain advantages it possessed, and at first it occurred to no one that it would ever do much more. But the electric lamp has within thirty years revolutionized illumination and has given us our light-flooded factories, with their greatly increased production and safety, and our Great White Ways as well.

A further example is the growth of our great city and interurban electric transportation service of today from the substitution of the electric motor for the horse on street cars.

There is good reason to expect that the electric operation of the railroads is capable of a similar development and will in time revolutionize our present transportation methods and provide us with services we know little or nothing about today.

Since the United States has an abundance of coal, railroad electrification here has been determined solely by local conditions. Passenger terminal problems caused the electrification of the New York Central at New York and the Pennsylvania at New York and Philadelphia. The limitations of the steam locomotive determined the electrification of the Baltimore tunnel on the Baltimore & Ohio, the Cascade tunnel on the Great Northern, the St. Clair tunnel on the Grand Trunk, the Hoosac tunnel on the Boston & Maine and the Detroit River tunnel on the Michigan Central. Examples of electrified railroads with freight as well as passenger service are the Norfolk & Western, the Chicago Milwaukee & St. Paul and the New York, New Haven & Hartford.

While the other electrifications are successful and interesting, the last three are more properly representative of general railroad electrification. The Norfolk & Western is an example of electrification under the heaviest conditions of freight traffic on a mountain grade. The Chicago Milwaukee & St. Paul has in operation the longest continuous mileage in the world, and when completed will cross five mountain ranges. The New York, New Haven & Hartford has a very large movement of both freight and passenger traffic. All three installations are successful and profitable and, when financial conditions are stabilized and the American railroad question settled, it is expected that all three will extend their electrified service.

In addition there are sections of railroads about the country where the present congestion of traffic or the availability of water-power warrants the early adoption of electric power. These possibilities alone promise under normal conditions of finance (as no engineering problems now remain to be solved) extensive activity in the electrification of railroads for many years to come.

Different from America, European and South American countries, with the exception of England alone, lack an adequate supply of fuel, but many of them including Norway, Sweden, Switzerland, Italy, Spain and Brazil, have large amounts of water power, while France has a moderate amount. These resources combined with the high cost of fuel make extensive railroad electrification in these countries inevitable sooner or later.

The neutral countries will probably be the first to undertake this work, Switzerland having a program covering a term of years well established, while both Norway and Sweden are giving active consideration to definite projects. In England, a considerable amount of electrification is in contemplation along with the general plan for the electrification of industry. A French Commission, composed of Government and railroad engineers, have already visited the United States in order to thoroughly familiarize themselves with American practice. The Italian Government will continue their definite program as soon as financial conditions permit. An official Belgian Commission is already planning to rehabilitate with electric power at least a portion of the railroads destroyed by the Germans. In Spain, Brazil and South Africa as well, railroad electrification is under active consideration.

It is evident, therefore, that the next decade will see a large amount of railroad electrification in almost every quarter of the world.

Montreal Electrical Luncheon Club

At the meeting of the Montreal Electrical Luncheon on Oct. 8 the following were elected officers for 1919-20 season: president, Mr. W. H. Winter, Bell Telephone Co.; secretary-treasurer, Mr. T. H. Chennell, Bell Telephone Co.; Committee, Messrs. R. J. Beaumont, Shawinigan Water & Power Company; P. T. Davies, Southern Canada Power Co., Ltd.; W. J. B. Drew, Canadian General Electric co.; C. Duncan, Duncan Electrical Co., Ltd.; M. C. Gilman, Montreal Light, Heat & Power Co.; L. A. Johnson, Northern Electric Company, Ltd.; E.S.M. McNab, Canadian Pacific Railway Co's. Telegraphs; R. Moncel, Devoe Electric Switch Company; W. P. Roper, Canada Wire & Cable Company, Ltd.; Wm. B. Shaw, Montreal Electric Company, Limited; H. W. Wood, Canadian Crocker Wheeler Company, Ltd.; Finance Committee: Messrs. J. W. Pilcher, Canadian General Electric Co., Ltd. (chairman); J. J. Sorber, Economy Fuse & Mfg. Co. of Canada, Limited; C. Thomson, Fred Thomson Company, Limited; J. B. Woodyatt, Southern Canada Power Company, Ltd. Luncheon Committee: Messrs. S. W. Smith, Electrical Equipment Company, Ltd., (chairman); and A. J. Carroll, Eugene F. Phillips Electrical Works, Ltd. Entertainment Committee: Messrs. A. Dwight Smith, Northern Electric Co. Ltd. (chairman), and E. W. Sayer, Sayer Electric. Papers Committee: Messrs. G. E. Templeman, Electrical Service Commission (chairman); J. A. Shaw, Canadian Pacific Railway Co.; P. S. Gregory, Shawinigan Water & Power Company; P. A. McFarlane, Bell Telephone Co. of Canada, Ltd.; G. C. Read, Civic Investment & Industrial Co.

Lieut. H. P. Ilsley, R. A. F., Croix de Guerre with star was the speaker. He spoke on "Aviation", relating his experiences as a pilot and observer in France. Corps flying was described as consisting largely of keeping contact between the infantry and the command by flying between two layers of British barrage and at the same time dodging German shells and machine gun fire. Scouting and bombing were referred to as being particularly dangerous work, the casualties of which quickly exhausted the personnel of the flying squadrons, making constant reinforcements of men and machines a necessity. Lieut. Ilsley repudiated the general belief that flying men were supermen and heroes, saying they had a better time than the infantry, although their work was hard on the nerves.

The Contractor-Dealer

Developing the Farmer's Trade

The dealer in farm lighting and power plants should not fail to take advantage of the organization among farmers represented in many sections in Canada by the U.F.O. It is easier to influence this class collectively than individually, and it saves both time and expense. The strength of the farmers' organization is is shown by the recent Ontario election, where some forty odd U.F.O. candidates were successful. Salesmen of farm plants should see to it that their members of parliament are "sold" the idea of electric light and power for their constituents—that they carry back from their first visit to the seat of government a firm conviction that they have some good news for the farmer, something that will put him on a par, both as to convenience and luxury, with his city cousins. The matter of "the price" is no longer the important factor with the farmer that it was ten years ago. Witness the spread of the automobile industry among the country folk. The cost of a light and power plant is about the same as the cost of an automobile—perhaps less, for the farmer doesn't buy a cheap car—and it surely should not be difficult to advance as many arguments on the merits of an electric plant as on a motor car—keeping the young folks at home, the power features, the possibilities for a water supply, safety from fire around barns and stables, all-the-year-around availability—not like a motor car, which must be put into storage with the approach of bad roads.

The farmer is the next logical field for electrical development and the better he is organized the easier it will be to convince him. Take full advantage of the U.F.O.

Making it Another "Electrical" Christmas

The Society for Electrical Development, United Engineering Societies Building, New York City, is launching a smashing big campaign to help get more and better business out of the coming holiday season. It will be called "An Electrical Christmas" and it is promised that it will be all that the "Electrical Christmas" was in 1917 and more. Here is an advance list of the sales helps bring prepared:

Special Features

The poster: Partly owing to the printers' strike in New York, but mainly because of its great success, the same poster design will be used this year as in 1917. A reproduction of the design, without its seven colors, is shown herewith; size 28 x 36.

Window cards: Including the poster design and a compelling sales message; in colors, 11 x 22.

Price cards: Set of 8 cards featuring electrical gifts that clean, cook, wash and iron, sew, light, etc.; complete for use; printed in colors on stiff cardboard, each 5 x 7.

Poster stamps: Always popular, always effective. Similar to the 1917 stamps. Stick them on your packages, letters, etc.

Suggestion leaflets: Little four-page folders suggesting over a hundred electrical Christmas gifts; for distribution through mails or from your store; two colors; room for imprint.

Printed Letters: Two-color printed letters which will take the message "Give Something Electrical this Christmas" to your prospects; room for your imprint.

In addition to these business getting helps there will be cuts for newspaper ads., lantern slides, motion picture films, newspaper items—everything to make the campaign a big success.

The following prices are being charged

Material	Members	Non-Members
Window lithos. (Posters) 28x36	Free	Free
Window cards 11 x 22	Limited quantity free	Two free, additional 10 cents each
Price cards 5 x 7	1 set free, additional 25 cents per set	25 cents per set
Poster stamps	500 free, additional $3.50 per 1000	$3.50 per 1000
Suggestion folders	500 free, additional $5.00 per 1000	$5.00 per 1000
Printed Letters	100 free, additional $2.00 per 100	$2.00 per 100

The campaign is open to everybody in the industry.

Dealers' Christmas Helps

A Christmas advertising campaign that should bring good results to the dealer is now in preparation and will be run shortly, by the Northern Electric Company on the Manning-Bowman line of irons, toasters and percolators and their own line of sewing machines and vacuum cleaners. In twenty-five of Canada's leading daily papers, there will be an exceptionally good advertisement on these electrical appliance lines, featuring "Making Christmas an Electrical One." The size of this advertisement will be of a generous space and be run frequently during the month of December. A special Christmas folder printed in four colors, green, red, gold, and black—attractively made up, will be sent to the dealers and arrangements will be made to imprint the dealer's name and address. Along with this, they are also arranging to forward to their dealers photographs of window displays. New show cards showing the company's vacuum cleaners and electric sewing machines have just been designed for this Christmas campaign. They are claimed to be the most elaborate and attractive show cards ever offered to the Canadian trade and will go a long way to create both in a pleasing atmosphere and an actual value. This should be one of the most complete campaigns ever offered by a Canadian manufacturer or jobber to assist the electrical trade.

Proper Shop Lighting

The Commissioner of the Iowa Bureau of Labor Statistics says: "Modern shop engineering places great stress on proper shop lighting. No other agency is more conducive to accident than poor light in factory, work shop or other place of employment. Many of the establishments in Iowa are housed in other than buildings constructed upon modern plans, with the result of miserable lighting facilities, endangering life and limb, and ruinous to eyesight, the latter in turn productive of greater accident hazards. Provision should be made to provide an abundance of light, based upon approved modern lighting principles."

Business-like Ideas on Getting Contracts—Extracts from "Electrical Contractor-Dealer" Interviews with Men Who Have Proven Their Worth

A Sign on the Job Under Way

"It may not be an entirely new idea, but I am at least using it in rather a new way," says an electrical contractor recently in speaking of plans to obtain contracts. "And it's simple enough, too, for it's just a good-sized sign carrying my name on the job that I am doing."

The placard was exhibited. It was of a size about 12 x 18 inches, bearing the contractor's name and address, preceded by the wording, "The Electrical Work on This Job Is Being Done By," and followed by a brief expression that all kinds of electrical installations are handled. This is lettered in an attractive and eye-compelling manner on a sort of canvas, with one smooth side, making the sign good for extended service and far more substantial than on heavy paper, as ordinarily found. This placard is fastened to the front of the new building in course of construction with the use of small wood strips around the four corners, insuring constant preservation.

"I do not wait until I begin my work on the job to put up this sign," continued the contractor, 'but arrange to display it as soon as the front wall is of sufficient height. The building contractor, as well as the owner, will invariably let me do this, and I get the benefit of this publicity notice almost from the time the work starts to its completion. If it is a big building, I use two signs, and even three, at times."

"Can you trace new orders from this?" he was asked.

"I certainly can," he replied, "one or two of the nicest jobs I ever had came as the result of inquiries from such signs. The more prominent the new building location, the greater the opportunity, of course, for catching the eye of possible prospects—and you never know who is a prospect for electrical work; it may be a new house, office building or store, or the wiring of an existing building. But I mentioned that I was using the sign in a rather new way: this is what I do:

"After my notice is on the building, I arrange with a local photographer to take a picture, showing as good a view as possible of the new structure, and, of course, bringing out my sign prominently—in truth, I frequently have this intensified on the negative. This is a professional photographic job, and the result is always pleasing. Photographs attract attention, so one of these goes up on my window right away; in fact I always keep two or three photographs of current work on my window, with caption beneath explaining the job, its locality in town and any other necessary details. These photographs attract the attention of passers-by throughout the day; during busy hours, I frequently find two, three and more people looking at them. This I consider as good and very inexpensive publicity work, and as I have said, it has brought new contracts to my shop.

"But I am not through yet. The representative newspaper of the community has a building section once a week, and quite naturally, in boosting local affairs in this line it likes to brighten up its page. So, while the work is fresh, or as soon as the photograph has been made, I furnish a print for this purpose—and again, at practically no cost, I am advancing the interests of my business with an eye to new prospects."

"There is still one more use I make of these photographs," continued the electrical contractor, "but this is a little outside of my regular plan. I am speaking of the movie houses. When I have a particularly interesting job and I think that the time is opportune, I have a slide made of the photographs, or it might be two, and these are flashed at a couple of the local theatres. It all helps, you know."

The Use of Reading Notices

In another city there is an enterprising electrical contractor who is a strong advocate of little "liner" advertisements and reading notices. He claims that this is consistent and persistent publicity at very small expense, and it bearing excellent fruit. He was asked how the plan was worked.

"Why do I believe in little liner advertisements? Well, just because they bring me new business and often from the least expected quarters. When I spend a dollar for my business, I want that dollar to count. I never went in for other advertising and don't think now that I ever will—at least, not as long as my present plan is pulling so well.

"Our local newspaper has a big circulation throughout this section; it is an evening daily, alive and up-to-the-minute; it goes for miles around, reaching all classes of people. This paper allows for little liner insertions. Sometimes these are placed at the bottom of a column, sometimes in the middle, and in fact, about wherever they can be arranged in connection with the make-up. I have worked up a series of good short notices, running two and three lines, on the average, setting forth such terse suggestions as: 'Wire your home now.' 'Enjoy the ease and convenience of electric service—wiring a home costs very little.' 'Electrical contracting of all kinds,' and so on, followed by my name and business location.

"These are inserted in different parts of the paper, from the front page to the back, sometimes running as many as six to eight different expressions in an evening edition. I used to be of the opinion that dividing the series a little and being in the paper every night was the best plan, but recently I have rather changed my view. I now alternate, running the announcements or notices one week on Monday, Wednesday and Friday, and the following week on Tuesday, Thursday and Saturday.

"This plan allows me to concentrate more fully in the editions in which the notices appear, and incidentally, it doesn't make them quite so common. Every other night, you see, I come back all the stronger, with my name and business as an electrical contractor showing on every other page or so. A real estate page is printed in the paper about twice a week, covering all sorts of news of this kind, as new building work, exchanges, sales, mortgages, and so on. I arrange to be on this page, usually, sometimes three and four times, as many readers are possible prospects. I consider it a valuable page.

"This little idea has brought me many inquiries and considerable actual business; it has been very profitable, and has given me leads on prospects for both large and small work that I do not believe I would have come in contact with in any other way. Occasionally I arrange for a little news item covering a list of some of the work I may be doing at the time, or other pertinent information, and this helps, too. The paper will insert these at no cost, as they are of current news value to realty interests, in which department of the paper they are usually used. This is just driving home my line once more, and I try to make them of the class and character that goes to build prestige."

Co-operating with Building Interests

Still another electrical contractor secures practically all of his new business through local realty and affiliated interests. He keeps in close contact with architects, builders and real estate men of all kinds. He goes to see them, he telephones them, and he co-operates with them. He is after business and they know it, and there is little worth while going on locally that he isn't informed of. He is live and active, as may well be imagined, and never leaves a stone unturned in connection with securing a possible contract.

His plan is as simple as it is effective, and can be summed up in the expression, "a good mixer." This personal solicitation work he handles himself he has the contact, and he wants to keep it. He believes it is more desirable to be on the outside than on the inside, and accordingly has developed his business to have a good substitute in the office at all times—a man who is possibly as competent to handle such matters as he, himself.

Hardly a week goes by without a personal call on these different interests; it is a systematic and regular occurrence, and if it does become impossible through unforeseen circumstances, a telephone call surely takes the place. The little calls and visits are just of the length that the one being seen might desire, for if this party will talk, the policy is to let him, particularly as in that talk an intimation of possible new business is likely to come out.

The general findings and conditions are not trusted to memory, but jotted down immediately upon leaving the office or establishment, if not before, and following, are recorded carefully on card files at the contractor's office. Where pending matters will come to a head within say a week or two subsequently, these are arranged in a "tickler" file under the proper date. Nothing is missed—it is a business proposition from start to finish, and takes the place of advertising, publicity, or other forms of promotion.

Then there is a spirit of co-operation and reciprocity. This contractor tries to return little "tips" and this or that inside information as to new buildings, alterations, etc., about to be launched. This is spread in the right channels where it will not only do the most good at the immediate moment, but where it will later, upon maturity, present possibilities for a return of the favor with a contract for an electrical installation. Under these circumstances this is comparatively easy and comes about almost in the course of the day's work, for with numerous contacts and extensive "mixing" an interchange of advance plans and activities is only natural.

Take, for instance, a recent case. This contractor learned of a sale of a lot through a visit to the office of one of his real estate friends; he was fortunate enough to be there when the deal was closed. He immediately ascertained in conversation with the new owner that a dwelling was planned, and he recommended one of his good architect friends to handle the design and construction. It does not take much of a guess to mention the party getting the electrical contract for the work when the architect suggested prepared the plans. And this is only one of numerous illustrations that might be cited.

In telling the inner workings of the plan, the contractor says: "My present way of promotion is all the advertising I want. The big secret of the whole idea is to develop the right contacts and then work those contacts for all they are worth, using of course, diplomacy and tact as you go along. I do not see how an electrical contractor can fail to increase his business if he engages along these lines in the right way. For me, it's a winner."

Electrical Representation in C.M.A.

Messrs. Paul Sise, of the Northern Electric Co., Montreal, and H. W. Matheson, of the Canadian Electric Products Co., Ltd., Shawinigan, have been elected members of the executive committee of the recently formed Quebec division of the Canadian Manufacturers' Association.

Eight Morals for the Electrical Merchant

By Mr. Lester G. Herbert

1. The retailer who would succeed cannot be content to arrange his stock and then wait for customers to seek him out. People are much surer to go where they are invited and wanted, than where no one has even thought of them.

Moral—Keep building up live mailing lists and classify these into groups such as the automobile owner, the housekeeper, the bachelor girl who does light housekeeping, the society girl, the traveler and so on.

2. Be courteous, not in the Lord Chesterfield interpretation of the word, but in a brisk, business-like, interested, deferential manner. That which is deferential need not savor of servility. Nothing is so inexcusable on the part of the selling force as indifference.

Ascertain what a customer desires. If the statement of need is a bit indifferent, don't start to ask questions, for this antagonizes. If the query is, "Do you keep electric warming pads?" it is a mistake to say: "How big a one do you want? How much do you want to pay? What do you want to do with it?"

It is more tactful to remark:

"We do. I will show you several which we can recommend." It will take but a moment then of close observation to find out what the customer really needs and to swing the sale in that direction.

Moral—Courtesy and tact are twin sisters, the mother of them is Close Observation.

3. Never make the mistake of showing the cheapest article first, for first impressions are lasting, and the customer who has seen a cheap article is likely to declare himself suited with it and to be honest in his declaration. Show the better class of goods first, and if these prove too high priced, come down the line, and a satisfactory sale of good stock is sure to result.

Moral—You never can tell by the looks of a customer the extent of his buying ability.

4. Where large accounts are carried, mistakes sometimes occur in charges and credits. When a customer calls an item into question, it is fatal to act offended. Be open minded and state frankly that no one is infallible. Hear the customer's explanation and make prompt investigation. If you are convinced that the claim is correct, make the adjustment cordially and willingly. This will hold a customer. To do it grudgingly, makes them feel that they are liable to be taken advantage of if they don't watch out.

Moral—Do as you would like to be done by.

5. As nearly as possible see to it that all bills and statements are mailed the first day of each month. The early bird catches the worm, and the early statement gets the cash. To be careless about rendering accounts is to court disaster.

Moral—Close collecting is one of the secrets of success.

6. When asked to bid on a contract, be specific, stating the grade of materials used. This will often clinch a good-sized transaction, even when there are lower bidders.

Moral—Don't be afraid to tell of the quality of your stock and service.

7. "Advertising is the sunshine of business." Let the sun shine. It is better to do a little advertising regularly and consistently than to make a splurge once in awhile. Keep your store and service in the public eye and mind so that when needs arise you will be the one sought as a matter of course. Remember, people are not mind readers, and they may not realize what they need in your line until you tell them.

Moral—Modesty in business does not consist of keep-

ing quiet, but rather of never making exaggerated claims.

8. How many people in your territory, do you think, would be glad to have a handsome new dining-room lighting fixture, a few additional lights here and there, or an attractive reading lamp? Nothing makes home more charming and attractive than well-lighted rooms. Reach out to these people and make them special offers which will convince them that the time to gratify their desire is now.

Moral—There is no time like the present to do business if you only know what you want to do.

Making an Electrical Market on the Farm

By Mr. H. C. Stair*

The last two years have been very prosperous ones for the farmers, especially through the Mid-West. Money is plenty and the growing familiarity with power apparatus, through the general use of the gasoline engine and the automobile has, so to speak, whetted the farmer's appetite for more power. The limitations of the stationary or portable gasoline engine are so manifest and its bother so great that the farmer is a live prospect for electric power.

My experience in the electrical game began several years ago with a garage in which I had a gasoline engine driving a direct-current generator. My neighbors wanted electric service and starting with those on the block, I gradually extended the lines for several squares around. Cambridge is a village three miles from the railroad, but its people are progressive and want all the latest conveniences.

Financing a Transmission Line

The town of Janesville is some 15 miles away and has electric service from a local central station. I had been thinking that perhaps we could have one of those transmission lines that are built for miles across the country. One day when Harry Caird, Sales Engineer of Julius Andrae & Sons Company, was with me, I said something about this and he assured me that it was entirely practicable to buy our power from the central station. Mr. Caird and I drove over the route between Janesville and Cambridge and made an estimate of the cost of the line and the amount of business we could secure. We found that the wholesale rates of the Janesville Company would leave us an attractive profit, so we proceeded to incorporate the Cambridge Light & Power Company and sell stock largely to the farmers who would benefit by the line. Work was started in the summer of 1918 and power was turned on Oct. 27. We secured an experienced line-construction foreman from Mr. Caird, and one or two linemen; the rest of the gang were picked up locally.

In all, we constructed 14 miles of main line and three branches, totalling 3½ miles. These branches were paid for by the farmers servd. All farmers payed for their own protective devices and service wiring. These transformers range from 1 to 5 kv.a. In Cambridge, we placed two 25-kv.a. transformers and connected them to the 110-volt distributing system. In three small communities en route, we placed transformers at our own expense.

Keeping the books and collecting bills takes only about one-fifth my time, so in the remaining I conduct an electrical supply business. The Light Company does not sell appliances or do house-wiring, so nearly all this business comes to me. When I state that we have two-hundred consumers of which about half live in Cambridge you will see that this is a market worth cultivating and extending.

What One Farm is Worth

The average farmer will need a transformer, lighting fixtures, household appliances, a pumping outfit and at least one other motor. They are all eager for service and we can connect them up as fast as the lines are built.

On the average, a farmer will have in his house a water-pump with automatic control delivering into a pressure tank; a vacuum cleaner; an electric iron; and a washing machine. In his barn he will have a 10-horse-power motor driving a feed mill and a ¾-horsepower motor driving a line shaft to which is connected the separator, churn, and water pump for the stock. He will have the usual lighting fixtures in his house, and lamps in the stables, cow sheds, feed-room, and one or two in the yard. These are arranged to light the paths between house and buildings and are controlled from three or four places by four-point switches. In addition, each farmer can be counted on for one or more additional devices, such as table appliances, meat choppers, buffers and grinders, or a general-utility motor to be moved around as the work requires.

The farmer has plenty of money; he pays promptly and he has learned to value his own time and labor. If you can show him, you can sell him, and the business is there if you'll go after it.

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*President, Cambridge Light and Power Company, in "Contact."

Manufacturing Electric Furnaces

The Volta Manufacturing Company, of Welland, recently installed two 6-ton capacity furnaces in Hamilton and a 1-ton furnace at Walkerville; they also recently shipped a 6-ton furnace to one of their customers in New Zealand, to be used in manufacturing steel. This company manufactures electric furnaces up to 10-ton capacity for use in making steel, pig iron, grey iron, calcium carbide, ferro-silicon, ferro-manganese, ferro-chrome and other iron alloys. These furnaces are designed especially to meet the particular purpose for which they are installed, the company making a specialty of furnaces of the tilting type for the manufacture of electric steel. In addition to furnaces, they also manufacture electric furnace accessories of all kinds, such as automatic regulators, hand controllers, current transformers, electrode holders, roof coolers, electric winches and magnetic brakes; also travelling cranes and mono-rail systems, etc. They also build special equipment as called for and do general consulting work. The manager of the company is Mr. J. Young.

D & W Fuse Co. Representatives

The International Machinery and Supply Company, 421 St. James St., Montreal, have been appointed by Mr. W.S. Sisson, sec.-treas. of the D.&W. Fuse Co., Providence, R. I., sole representatives for the Montreal district, to handle their complete line of enclosed fuses and cutouts as well as their well known Deltabeston wires, cords and other specialties. One of the most important lines manufactured by the D. &. W. Fuse Company is their oil cutouts, for both pole and railway service. These are in use all over the dominion and the United States, and are made from 2,500 volts to 16,000 volts. Catalogues of the complete line will be furnished on request to the International Machinery & Supply Company. Mr. R. J. Hiller, manager of the electrical department of the company, is to be congratulated on securing this agency.

Mr. Kelly Will Visit the West

Mr. Thos. F. Kelly, sales manager of the Hoover Suction Sweeper Company of Canada, Limited, will shortly take a trip to the Pacific Coast for the purpose of opening up new dealer connections. Mr. Kelly expects to leave Hamilton about the 5th of November, and will stop at Sudbury, Sault Ste. Marie, Port Arthur, Fort William, Winnipeg, Portage la Prairie, Brandon, Moose Jaw, Saskatoon, Edmonton, Regina, Calgary, Victoria, Vancouver and New Westminster.

Mr. Goodwin and Mr. Corcoran Speak on Merchandising at Buffalo Electric Show—Fifty Ontario Delegates in Attendance

Close upon fifty members of the Ontario Association of Electrical Contractors and Dealers ran over to Buffalo on Friday afternoon, October 24, to see the electric show being staged there and hear Mr. W. L. Goodwin again. There were representatives from Toronto, Hamilton, Kitchener, Brantford and other Western Ontario cities where the fever for "better merchandising" has seized the members of the various branch associations.

Mr. Goodwin had spoken at some length previous to the arrival of the Canadian delegates, but, for their special benefit, very kindly gave a brief resume of his previous talk. He outlined the changes that had taken place in the electrical industry during the past five years. Formerly the sale of electric current was the predominating industry; today it is the sale of merchandise to utilize the current. As much as 80 per cent. of the income of many central stations is from the sale of electrical appliances, the other 20 per cent. being derived from the sale of current.

The development of the past three or four years indicates that a tremendous increase in demand for electrical appliances may be expected during the next few years. That demand is becoming so great that our factories are unable to cope with it and central stations are unable to supply the current. There is more need than ever to-day under such conditions for the various sections of the industry—manufacturer, central station, jobber and dealers—to work collectively and in unison.

Mr. Goodwin again touched briefly on the question of discounts for quantity purchases. Price, he maintained, must depend absolutely upon the service rendered. The little dealer must have an equal advantage with the wealthy corporation. If the purchase of a thousand of a certain article demanded no more expenditure in the way of service than the purchase of a hundred, then the customer purchasing the smaller amount has a right to the same price. The theory of quantity discounts is wrong.

Mr. Goodwin also spoke briefly regarding the necessity for standardization. At a recent convention he had heard a manufacturer state that there were, at the present time, as many as a million and a quarter combinations in the manufacture of transformers. These, Mr. Goodwin believed, might be reduced to one per cent.; or, perhaps, one-tenth of one per cent. of this number. The object of the industry, as a whole, should be greater production, economical production and distribution, fair profit to the dealer and a fair price to the consumer.

He briefly disposed of the argument frequently raised that the jobber is an unnecessary factor in the business. He must have been reading the remarks of a certain commissioner, who recently stated, in Toronto, that he had always held the opinion that the jobber was a luxury in business. Mr. Goodwin said that the jobber's function could be performed by any other party or under any other name, but would still remain the same. The manufacturer may manufacture solely, or manufacture and distribute to dealers. In the latter case he also performs the function of a jobber. This explains why manufacturers were unable to give jobbers' discounts to contractors. If the manufacturer himself dealt directly with contractors, he was performing the function of a jobber as well as a manufacturer, and, in all fairness, should charge the expense of jobbing to this contractor.

He then briefly ran over his twenty-one planks which we have already printed in the Electrical News. He concluded with an eloquent plea that we all get together to develop this growing industry—this infant, as he called it—into a healthy, husky adult.

Visualizing—A New Profession

Mr. Goodwin was followed by Mr. Corcoran, who commenced by saying that he was going to give his hearers a little talk on "visualizing." Visualizing, he said, was a new profession. For example, we speak of a certain motor revolving 1800 revolutions per minute, but we have very little conception of the meaning of this expression. Mr. Corcoran at this stage produced a coil of paper some three inches wide, which he unrolled and circled completely around the hall. On this coil were shown 1800 circles about 2 inches in diameter. "That," said Mr. Corcoran, "will give you some idea of the number of revolutions a motor makes in one minute. You get a dim impression with the ear; you get a much more definite and accurate impression with the eye—that is what I mean by visualizing."

Following out the same line Mr. Corcoran proceeded to illustrate, by means of charts, certain striking features in connection with the electrical industry. First he gave certain statistics dealing with the number of homes in the country, the number wired for electric light and power, the number of appliances used, the number of homes unwired and the possible market for more appliances.

Passing on, Mr. Corcoran spoke at length on the various features entering into a proper merchandising business. There was the store, its location, its exterior appearance, its interior appearance, the personnel of the staff, the fixtures, the interior arrangement, and so on. He outlined what he considered a fairly ideal characteristic of a salesman; he must be courteous, careful, energetic, neat, loyal, honest, intelligent and be properly seized of the value of giving service with every item he wrapped up. "Retail salesmanship," said Mr. Corcoran, "is a science today."

The arrangement of stores he divided into two classes—the jewellery type of store and the hardware type of store. The jewellry type specializes in only high-class goods. Service was as important as quality. The displays were never conglomerate or crowded. The salesmanship was intelligent and deliberate, and calculated to bring the customer back to the store. The hardware type of store was more on the "hand-out" type. It lacked the idea of service. This was largely because the hardware man had not the knowledge necessary to give service.

Mr. Corcoran showed a typical store plan which he conceived to be as nearly ideal as could be reached by the average dealer. It must have an attractive entrance with deep windows, well dressed. The ideal store would have two doors with space between for a showcase looking on the street. Lamps, for which there was probably the greatest demand, should be placed in the rear of the store so as to induce the greatest possible number of customers to pass the complete display. A demonstration room also should be placed at the back. The idea of arrangement throughout should be such that the customer would be forced to see as much as possible of the display.

A forest of fixtures is generally not an attractive display—though there may be exceptions to this, depending on the location of the store and the class of customer to be served. Showcases are always valuable—the day of keeping things hidden under the counter until people come and ask if you have them, is past. Use color whenever possible in your decorations; it helps to brighten things up. Use demonstrations to the limit. Make greater use of your telephone to effect sales, or to bring customers into your store to watch demonstrations.

"Finally," Mr. Corcoran said, "every article on sale

(Continued on page 47)

Here's a Christmas Present for You

YOUR WINDOW DISPLAY IS YOUR BEST SALESMAN

Between now and Christmas the Electrical-Dealers of Canada will be putting forth their best efforts to attract the holiday trade and some fine window displays will be shown.

The biggest problem before the electrical industry to-day is not engineering or manufacturing—the real problem is "merchandising."

We believe that well dressed windows—goods properly and tastefully displayed and demonstrated—are the most effective means of increasing the sale of electrical appliances.

With a view to encouraging the art of window dressing among electrical contractor-dealers, and, also, having in mind the value of the interchange of good merchandising ideas, the Electrical News offers four prizes for best dressed windows, under the following conditions:

(1)

First prize	$35.00
Second prize	20.00
Third prize	10.00
Fourth prize	5.00

(2) The contest is open to any electrical contractor-dealer, municipality or central station in Canada.

(3) Photographs of window displays must be in our hands by December 31, 1919.

(4) Explanatory notes up to 100 words may be submitted with each photograph.

(5) The merits of the photographs will be judged by an impartial committee of three—one manufacturer, one jobber, one contractor-dealer.

Plan now to enter the competition. You have an even chance to win a prize. In addition to that, however, it is a dead certainty that your effort to produce a better window display will be reflected in your more abundant Christmas trade.

Address photographs and all communications:
"Best Window" Contest,
Electrical News,
347 Adelaide St. W., Toronto.

What is New in Electrical Equipment

The Non-Twist Canopy Ring

The man who installs electric fixtures will appreciate the value of a new fixture part called the "Non-Twist Canopy Ring," which is now being placed on the market. The purpose of this fitting is to improve the present method of installing fixtures and canopies. The ring itself is a socket joint arrangement as shown in one of the illustrations herewith. In the actual operation of installing fixtures this ring is first connected with the lamp socket, loop or fixture arm, as the case may be, and the wires allowed to extend up from the fixtures through the ring. The wires are then threaded through the canopy and on through the "nipple" crowfoot where they are connected, soldered and taped in the usual way. The special value of the Non-Twist Canopy Ring is that it admits of the fixture being drawn up tight against the ceiling or wall without any twisting of the wires. In pointing out the main advantages of this fitting, the Non-Twist Canopy Ring Company also draw attention to the fact that this invention eliminates the use of the slip canopy and makes it possible in every installation, to bring the canopy flush and tight against the wall where it will remain firmly fixed.

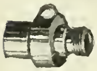


Fig. 1

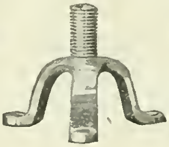


Fig. 2

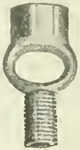


Fig. 3

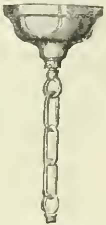


Fig. 5

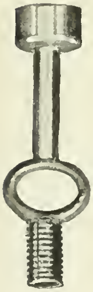


Fig. 4

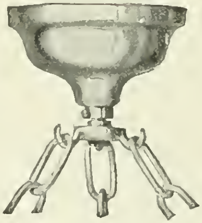


Fig. 6

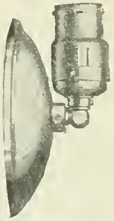


Fig. 7

Various heights of crowfoot are designed for canopies of various makes and size. A very flat crowfoot allows the use of shallow three-quarter inch canopy. For very deep canopies an extension tube is provided which forms a part of the crowfoot.

The various illustrations herewith will explain the device—Fig. 1, the non-twist canopy ring; a two-part ball and socket arrangement; Fig. 2, the crowfoot with the nipple as an integral part; Figs. 3 and 4, two forms of extensions—for ease in installation the wires pass only through the threaded end of the tubes and out through the loop; Figs. 5, 6 and 7, illustrating the various types of fixture installed with non-twist canopy rings.

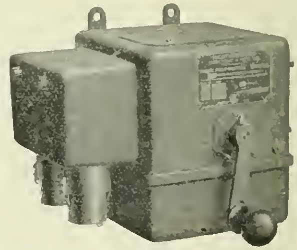
This fitting is the invention of Mr. F. D. Parmenter, of Toronto, to whom patents have been allowed in Canada, United States and Great Britain. It is Mr. Parmenter's intention to make this fitting available to manufacturers of lighting fixtures and to contractors and dealers. Announcement of the formation of the Non-Twist Canopy Ring Company appeared in the October 1 issue of the Electrical News.

Safety Starting Switch

Safety for the operator, safety for the motor and equipment and safety for itself are the three features embodied in a new type of starting switch for small induction motors that is being put on the market by the Westinghouse Electric and Manufacturing Company. The switch is absolutely accident proof, and well nigh fool proof as well.

The action of the switch is automatic, and consists of strong springs attached to the contact parts and controlled by a trigger. This trigger is released by overload, failure of power or by hand. When the switch passes the neutral point, the spring snaps it the rest of the way. The switch is shown in the accompanying illustration. Safety to the operator from injury due to contact with live parts. This is assured by the entirely enclosed, dust-and-dirt proof case. It is impossible to touch the live parts by accident for this reason.

Safety to the operator and equipment from restarting after the machine has shut down. When power leaves the equipment, a low voltage protective relay releases the trigger and throws the switch. Upon the return of power, it is necessary for the operator to move the handle first to the reset position and then to the running position, before the motor can again be started.



Any undue overload causes the overload relay to release a trigger which opens the switch the same as on failure of voltage. Overload throws off the switch just the same as no power, and the switch must again be reset before the motor can again be started. This overload relay prevents burn-out of the motor. Motor burn-outs may arise from two causes—an overloaded machine or the opening of one wire, due to the blowing of a fuse or other cause and subjecting the remaining phase to a double burden. The overload relay may be set to open the switch at any desired point, such as 105%, 110%, 150% of full load. Fuse protection is not sufficient to guard motors against burn-out. A fuse that will carry, without blowing, the starting current which is several times the operating current, will also carry, without blowing, sufficient overload to burn out the motor. The overload relay is provided with oil dash pots, which afford a time element, permitting the carrying of small peak loads and the starting current without interruption of service. However, they will allow the operation of the overload relay if the overload is heavy or is sustained long enough to threaten the motor. This insures the motor against burn-out and at the same time permits maximum production.

Replacing burned out fuses with copper wire when new fuses are not available, results in a burned out motor, the next time an overload occurs. This danger is eliminated because the new switch uses no fuses and automatically resets itself when the overload is removed. Besides this, the danger of shocks and burns in replacing burned out fuses is eliminated.

When the handle of the switch, moving toward the "on" position, passes the neutral point, the spring whips the contacts together The same action takes place with the opening of the switch. This rapid opening and closing of the contacts, practically eliminates the injurious effects of arcing and preserves the life of the switch.

Asbestos barriers, between the sets of adjacent contacts, have permitted the omission of switch oil with all its accompanying fire hazards and other objectionable features. But when explosive gases are present and the danger of explosion is greater than the fire hazard, the contacts may be immersed in oil.

Emergency stop push buttons may be connected in the low voltage relay circuit and located at any convenient point near the machine. This switch has been approved by the National Board of Fire Underwriters. Two sizes are made, each for use on two and three phase motors, on voltage up to 600. Type No. 815 starts motors of 10 h.p. or less, while type No. 816 starts motors up to and including 25 h.p.

The "Kribs" Electric Washer

Mr. Gordon Kribs, for many years assistant engineer with the Hydro Electric Power Commission of Ontario, and, previous to that, with the Electric Power Company, recently resigned from the Commission to associate himself in business with his father, Mr. W. A. Kribs, in the manufacturing business in Hespeler, where Mr. Kribs, Sr., has been established for many years. The new firm will manufacture a complete line of domestic labor-saving appliances, including washing machines of the various types. We understand they intend making a specialty of a moderate priced washing machine which can be sold so as to place it within the reach of nearly all prospects. This machine is now on the market in limited quantities, and arrangements are being made to increase production. Considering Mr. Gordon Krib's wide experience in engineering matters, both theoretical and practical, contractor-dealers will look forward with keen interest to the electrical products of this company.

> **Electrical dealers should consider it as axiomatic that no householder or other customer has ever reached the saturation point in the way of electrical appliances.**

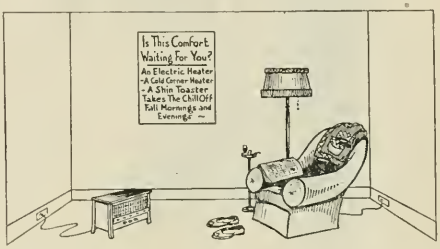
Turn the Dark Days to Dollars Account

These are the days to sell new lamps, reflectors and lighting facilities generally. There is no denying the fact that good salesmanship consists, in considerable measure, in catching your prospect at the psychological moment—an electric iron on an intensely hot ironing day; an electric washing machine on a dreary wash day; a vacuum cleaner in the midst of dusty housecleaning and bright new lamps on a dark rainy day in November. The meagreness of the illumination on a dark day suggests failing eyesight and encroaching old age; at such a moment the salesman with bright new lamps is a welcome and reassuring visitor.

Take advantage of the dark November days to see the offices and homes of as many of your customers as you can. There is much business waiting for you, not only in bulbs alone but in fixtures of every kind.

Don't Crowd Your Windows

The average window display, perhaps, endeavors to cover too wide a field. This has a tendency to divide the attention of the passer-by instead of concentrating it on some one item to the point of desire to purchase. The simple window also is easier to prepare and, further, admits of more frequent changes without exhausting your supply of ideas. In the accompanying illustration the dominant note is "Solid Comfort" and the cause of it, the electric heater. In the back of his mind the observer will also see the soft, artistic floor lamp effect. There is nothing else to detract from the scene—solid comfort—warmth and light.



The Electric Service Company have just issued catalog No. 142, entitled "Keystone Mine, Telephone and Signalling Apparatus." This catalog is well illustrated and contains a quantity of very useful information on this subject.

Personals

Mr. A. Gaboury, superintendent of the Montreal Tramways Co., has been elected a member of the executive of the American Electric Railway Transportation and Traffic Association.

Mr. L. R. Morshead, consulting engineer, London, the British representative of the Eugene F. Phillips Electrical Works, Ltd., Montreal, has been on a visit to Canada and the U. S. The company have been busy on orders for Great Britain, Australia and South Africa.

Mr. Goodwin Speaks on Merchandising

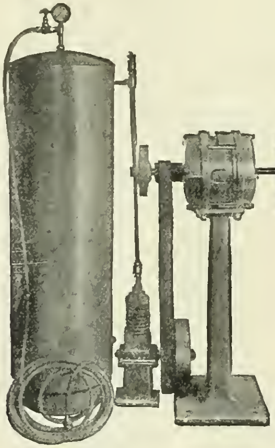
(Continued from page 44)

should have a price card. An appliance without a price suggests to the customer that you have something to sell that you feel costs more than it ought to. On the other hand, a price ticket, prominently displayed, indicates that you have confidence in that appliance and are proud that it can be produced at so low a figure."

At the conclusion of the meeting Mr. Goodwin expressed his appreciation of the presence of so many Canadian delegates, and announced his intention of visiting Toronto again in January. The definite dates and program will be announced later.

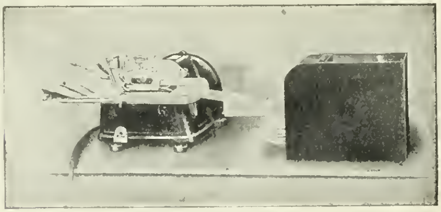
The Lebron Buffing and Grinding Stand

The illustration below shows an electric buffing and grinding outfit to work in combination with garage air service; a practical outfit embodying many attractive features. Note its simplicity of construction and how solidly the motor is fastened to the stand. It is an outfit that will stand up under the wear and tear of the busiest garage, performing three functions in one. It is sold exclusively in Canada by the Northern Electric Company.


Electric buffing and grinding outfit

Electrically-Driven Machine Opens 500 Letters a Minute

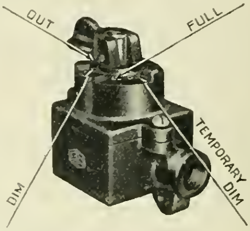
Opening mail at the rate of five hundred letters a minute, a mere fraction of the time occupied by the paper knife, a small electrically-driven machine is proving a highly effective builder of efficiency in business offices by saving money, time, labor and patience. With this machine, one person can open the mail in less time than five or more by the old method, and with greater safety and accuracy. Not only is confusion thereby reduced to a minimum, but responsibility is unquestionably centered. This machine built by the Bircher Company and known as the Lightning-Opener occupies but little space and can be placed on any table, desk or counter, all litter thereby being confined to a restricted area. Attached to an ordinary lamp socket, it is set in motion, by a mere snap of a switch, through the medium of a Westinghouse motor mounted within the case and consuming an amount of power so small as to be almost negligible. The envelopes are place on the feel table in a stack of forty or fifty at a feeding, and are conveyed automatically one at a time, by a feed belt, through two rapidly revolving circular knives which cut a very small shaving from the exposed edge of the envelope. The letters are then carried automatically into a stacker.


Letter opening machine

Switch for Dimming Locomotive Headlights

A new locomotive headlight switch has recently been put on the market by the Crouse-Hinds Company, Syracuse, N.Y. It is a self-contained, dust-tight switch that will effectively perform the duties of a double-throw knife switch for shifting from dim to full light, and a momentary contact switch for temporary dim light.

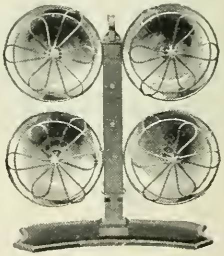
With an easy push the handle goes from the "off" to the "dim" position and another slight push sends it to "full" position. While passing another locomotive or when picking up signals it is not necessary to bring the switch back to the "permanent dim" position. The engineer merely pushes the handle from "full" to "temporary dim," holding it until he has passed the other train or the signals, after which he releases the handle and the switch automatically snaps back to "full" position. If going through a yard or a city where the headlight must be dimmed, a slight shift of the handle brings the switch back to the "permanent dim" position.



Locomotive headlight switch

The Quad Radiant Electric Heater

The Quad Radiant Electric Heater, which is shown herewith, is a unique idea which gives extreme flexibility in the way of a domestic heater. The various units of the group are separately controlled so that various volumes of heat are available. The units are also separately hinged so that a perfect distribution of heat may be obtained. It is manufactured by the American Electrical Heater Company, of Detroit.


The "Quad" heater

The Electric Furnace Company, Alliance, Ohio, have issued three new booklets as follows: Booklet 7-B is a catalog of their standard 105 kw. brass melting furnace. Boklet 17-B describes a special furnace for rolling mills, which is designed for pouring the metal directly into the moulds. Booklet 13-B is a careful discussion of the various electric non-ferrous metal melting furnaces.

Westinghouse War Memorial Scholarships

The awards of the four annual War Memorial Scholarships of five hundred dollars each, established by the Westinghouse Electric & Manufacturing Company, have just been announced. These awards were made by competitive examinations and the following men were successful: Herbert S. Pahren, Cincinnati, Ohio, employed as order clerk in the Cincinnati office of the Westinghouse Company, and a graduate of the Hughes High School, who has selected for his scholarship a Technical Engineering Course at the University of Wisconsin; Arthur Marthens, of East Pittsburgh, Pa., began work as a messenger boy before completing his studies in the Turtle Creek Schools. Mr. Marthens, while working in the Cost Department, prepared himself in the Casino Technical Night School to enter college. He has chosen a course in Electrical Engineering at the Carnegie Institute of Technology; Paul O. Langguth, a graduate of the Wilkinsburg High School, and employed as draftsman in the Engineering Department at East Pittsburgh, has selected as his award an Electrical Engineering Course at the University of Pittsburgh; Andrew P. Lesniak, a graduate of the Union High School, Turtle Creek, Pa., and employed in the Production Department at East Pittsburgh, has selected a course in Mechanical Engineering at the University of Pittsburgh.

Two classes of scholarships are provided: (a) For sons of employes of the company or its subsidiaries who have been employed for five years or longer. (b) For employes of the company and its subsidiaries who have been continuously employed for at least two years and who shall not, on September 1, have exceeded the age of 23. Not more than two class "B" scholarships will be awarded in any year. Each scholarship carries with it an annual payment of five hundred dollars for a period not to exceed four years, the payment to be applied toward an engineering education in any technical school or college selected by the successful candidate with the approval of the scholarship committee.

These scholarships have been established as a memorial to those employes of the company and its subsidiaries who entered the service of their country during the war. Four awards will be made each year, so that after three years this company will be maintaining sixteen of these scholarships in the best technical schools of the United States.

New Book

Elements of Radiotelegraphy—By Ellery W. Stone, member of Institute of Radio Engineers, United States Naval Institute. D. Van Nostrand Company, New York, publishers; price $2.50 net. This text was written primarily for the guidance and instruction of radio engineers in the communication service of the Navy, but will be found helpful in radio instruction in other military branches, in civilian radio schools and for the self instruction of those interested in the subject. The physical, rather than the mathematical standpoint has been considered, so that the book may be useful to the layman. One hundred and twenty-five illustrations and 32 plates; 100 pages; size, about 5 in. x 7½ in., imitation leather.

Repairing Broken Resistance Grids

Broken resistance grids are often thrown away, because no adequate means of repairing them suggests itself. The following method is employed by the writer, and as there is no mechanical strain imposed on the grids, it has proved very effective. In nine cases out of ten the break occurs in a loop in the metal; by placing one iron washer under and another over the broken section of the grid, and tightening them together with a short bolt or rivet, the broken parts will be held in position and will be as good as new.

Resistance grids for temporary service can be made with a strip of sheet iron. Cut the sheet from one side to within a short distance of the opposite side, and then repeat the operation from the other side, and so on throughout the strip. When pulled lightly by the ends the strip will resemble the regular grids. A hole bored in each end and it is ready to use.

Maurice S. Clement in "Electrical Record."

Physical and Mechanical Properties of Brass, Steel and Aluminium

Property	Brass	Steel	Aluminium
Melting Point, °C	950	1,400	655
Melting Point, °F	1,740	2,550	1,210
Annealing Point, °C	500	760	400-480
Annealing Point, °F	868	1,400	750-900
Specific Heat (Water=1).	0.094	0.117	0.212
Thermal Conductivity (Silver=100)	23.8	11.7	31.3
Coefficient of Linear Expansion per °C	0.0000189	0.0000120	0.0000245
Coefficient of Linear Expansion per °F	0.0000105	0.0000067	0.0000136
Specific Gravity, Rolled ..	8.62	7.74	2.71
Weight in lbs. per cu. in., Rolled	0.313	0.281	0.0975
Tensile Strength in lbs. per sq. in., Rolled	22,400	115,000	20,000-30,000
Elastic Limit as % of Tensile Strength	38	66	70
Modulus of Elasticity in lbs. per sq. in.	9,200,000	30,000,000	9,800,000

An attractive combination unit being handled by Nerlich & Co., Toronto

Current News and Notes

Almonte, Ont.

The town of Almonte, Ont., has taken an option on the Wylie power plant which will likely be taken over in the near future.

Bathurst, N.B.

Plans have been prepared for a hydro-electric power development at Grand Falls, on the Nepisiguit River, for supplying power to the Bathurst Lumber Co., Bathurst, N. B., in connection with their lumber mills and the new pulp plant. The current will be transmitted over a transmission steel power line, to Bathurst, a distance of 19 miles. Two units will be installed, provision being made for a third unit; each unit will be 4,500 h.p. The turbines will be of the vertical, umbrella type, direct connected to generators and will operate under a head of 100 feet. The dam and power house—the former 450 feet long—will be constructed of concrete. Mr. William Kennedy, Jr., of Montreal, is the hydraulic engineer, and Dr. L. A. Herdt, Montreal, the electrical engineer.

Guelph, Ont.

In addition to completing an investigation on matters in connection with the Street Railway here, the Ontario Hydro Commission has prepared estimates of the cost of an electric railway from Elmira to Kitchener, Galt and Dundas connecting with the contemplated lines from Toronto and London and to Niagara Falls as well as from Guelph to Preston and Galt.

Hamilton, Ont.

Supplementary letters patent have been issued to the Clemens Electrical Corporation, Limited, Hamilton, Ont., increasing their capital stock from $50,000 to $200,000.

Montreal, Que.

The Canada Brass Products, Limited, has been granted letters patent. They are empowered to deal in electric light fixtures, apparatus, fittings and so on, and the capital stock is $50,000; head office Montreal. Mr. Louis Payne is at the head of the company.

Ottawa, Ont.

The Ottawa Car Company, Ottawa, Ont., are erecting a brass foundry on Slater Street in that city.

Peterboro, Ont.

Mr. W. S. Wrong, of the Hydro-electric Power Commission, was recently in Peterboro in connection with the proposed Hydro radial route from Peterboro to Kinmount.

Quebec, Que.

Enterprises Les Electriques, Limitee, have been granted a charter. The head office is in Quebec.

Toronto, Ont.

The Canadian Consolidated Corporation have been granted letters patent to conduct a general electrical business. The head office is at Toronto and the capital $110,000. Mr. Geo. N. Sieger is at the head of the enterprise.

The proposal to build a civic car line on Bloor Street West, Toronto, from Quebec Avenue to Runneymede Road has passed the Ontario Railway Board and the Board of Control have recommended to the city council that the work be proceeded with without seeking approval of the ratepayers. The cost is approximately $160,000.

Wingham, Ont.

A hydro enabling by-law was recently passed by the ratepayers of Wingham, Ont. The by-law provides for an expenditure of $40,000 and was carried by a vote of 320 to 13. The Hydro Commission will start work at once, power to be transmitted from the Eugenia plant.

Winnipeg, Man.

The contract for a sub-station to be erected at Portage la Prairie has been awarded to Tremblay, Deniset and Company, of Winnipeg.

The fire and light committee of Winnipeg have recommended an expenditure of $1,350,000 on the hydro-electric system next year. It is stated that the demand for power has increased 30 per cent. during the past year and indications are that the increase next year will be even greater.

The Southern Canada Power Co. have extended their operations by constructing a line, six miles long, from Cowansville to Dunham, P.Q. This has enabled the latter town to install a system of electric lighting.

In accordance with the new agreement between the city of Sherbrooke, P. Q., and the Sherbrooke Railway & Power Co., the latter are doubling a portion of the tramway lines and extending the system.

The Electrical Appliance Co. have opened a store at 876 St. Catherine St. West, Montreal. Mr. R. H. Mainer and Mr. G. Hill are interested. Mr. Mainer was formerly in business in Winnipeg. The firm are specializing on the Hoover Vacuum cleaner, made by the Hoover Suction Sweeper Co., of Hamilton, the Apex washer, and Beatty Bros. Washer.

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Generation, Transmission and Application of Electricity

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Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

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Vol. 28 Toronto, November 15, 1919 No. 22

The Problem To-day is "More Sales"—How Much is Your Window Worth?

Our readers will have noted the announcement of the "Best Window" contest in our November issue. The announcement is repeated in the present number. The underlying idea in making this offer is that well-dressed windows are the most effective means at the disposal of the retailer in attracting the attention of the buyer and bringing him into the store.

We realize, however, that it is not the easiest thing in the world to get a good photograph even after you have made up your window and we are printing the following suggestions in the hope that they may be found useful. Of course it is the photo of the exterior that causes the most trouble.

Points to Remember in Photographing Windows

Take the picture at night. Have all lamps except those lighting the window put out while taking the picture.

Have the window well lighted. Replace temporarily all 25-watt and 50-watt lamps used in the top of the window with 75-watt and 100-watt Mazda C or Mazda C-2 (Daylight) lamps. Mazda C lamps give whiter light than Mazda B lamps and therefore have a stronger effect on the photographic plate. Mazda Daylight lamps are better than Mazda C lamps for photographic purposes.

If reflection from street lights or from windows across the street appear in the window glass, arrange to have such lights put out or shielded while the picture is taken.

See that no glare from lamps in the window enters the lens of the camera. Glaring lights cause large rings or "ghosts."

Never use flash-light; it shows in the picture.

Use portrait film for the picture if possible.

Set the camera solid and level in front of the window.

If the window is well lighted the average camera should be stopped down to at least 32 to get a sharp, clear picture.

The smaller the stop used the longer the exposure necessary. Usually an exposure of at least 15 minutes is required.

Make the print on glossy paper.

Commission of Conservation Issues Further Valuable Water Power Data.

The commission of Conservation of Canada have given further evidence of the splendid value of their work to the Canadian people, in their latest report—Water Powers of British Columbia. It has been generally known that this work was under way for some years but the war, of course, delayed it materially. Now that the report is published, however, it will come as a surprise to all that the Commission has been able to gather together, even over a period of several years, such a mass of interesting and educative information. The report is the work of Mr. Arthur V. White, consulting engineer to the Commission of Conservation, assisted by Mr. Charles J. Vick. The collection of data has been under the personal charge of Mr. White, who has necessarily spent much time in the Pacific Province.

There are not, it is true, any very startling figures in the report regarding British Columbia's water powers, the whole volume giving one the impression, however, that it is a tribute to Mr. White's "infinite capacity for taking pains." The field is covered completely—power, irrigation, navigation, fisheries, mining and other industrial purposes—with a thoroughness that leaves nothing to be added. When we say nothing "startling" we simply mean that the fact of 3,000,000 h.p. being available in this province occasions little surprise to a people accustomed to such heritages as Niagara Falls, the St. Lawrence River, the St. Maurice, the Nelson and others scarcely less important. It is evident, however, that British Columbia, though she cannot boast a Niagara, has ample power for some time to come, for, of the above mentioned total only about 250,000 h.p., or 8 1/3 per cent. has been developed. It is satisfactory to note, too, that a goodly proportion of the total lies within the railway belt, for, with the increasing price of coal and the uncertainties attending its production and distribution, there is certain to be an early movement towards trunk line electrification.

It is worthy of note that Mr. White has not been unmindful of the comfort and convenience of his readers. The text is logically arranged; the photographs are well chosen and excellently reproduced; the type is a good size and clear cut; it is noticeable also that Mr. White has kept in mind the necessity for thrift and economy, for there is a conspicuous absence of the lavish display of unused space so frequently seen in similar reports.

Altogether the report must be considered as a valuable addition to the sum total of our knowledge of the national resources of Canada and of their practical utility, and is one of which the Commission of Conservation may well feel very proud. In other pages of this issue a fairly comprehensive resume is given of the various chapters. For those who can spare the time, however, a careful study of the report itself will amply repay the reader for whatever expenditure of time and energy he may make.

Montreal Electrical Luncheon Club

At the Montreal Electrical Luncheon on November 5, Messrs. W. B. Shaw, of the Montreal Electrical Co., E. W. Sayer, of the Sayer Electric Co., and J. W. Pilcher, of the Canadian General Electric Co. were the speakers. The talks consisted of reminiscences, chiefly of the early days of electricity in Montreal, and also of amusing incidents arising out of their business experiences. Mr. Shaw recalled the early days of the Maxim and Royal Companies, and of the difficulties met with and overcome by Mr. Fred Thomson. In those days the Royal Company had to make everything in the way of electrical fixtures, and there were also great difficulties in wiring. Mr. Pilcher said that the difficulties to-day were very insignificant as compared with those of, say, 30 years ago. As the oldest salesman in the electrical business in Canada, he appreciated the improvements that were now in existence. The Entertainments Committee were asked to consider the advisability of holding a smoking concert.

The Electric Club of Toronto

A number of prominent speakers have addressed The Electric Club of Toronto during the recent past. On October 24, Mr. Herbert Dennison, well-known patent attorney, spoke on Patents. On October 31, Major Drew of the Soldiers Civil Re-establishment Department outlined the work being done in the way of educating and establishing returned men. He was accompanied by Mr. Young, Mr. Fletcher and Major Epps, each of whom spoke briefly on his special department of the work—Mr. Young on "Interviewing," Mr. Fletcher on "Industrial Survey" and Major Epps on "After Care."

Mr. W. A. McLean, Deputy Minister of Highways of the Province of Ontario, on Nov. 7, gave the members a brief outline of the work being done by his department. He stated some interesting facts regarding the economies that have been effected by farmers and others through the use of motor transportation, only made possible by good roads. Mr. McLean emphasized the point that neither first cost nor cost of maintenance of roadways and motor trucks must be allowed to overshadow the advantages gained in time and efficiency.

Mr. Paul M. Lincoln, past president American Institute Electrical Engineers, will be the speaker on Nov. 14. His subject will be "Electrification of Railways."

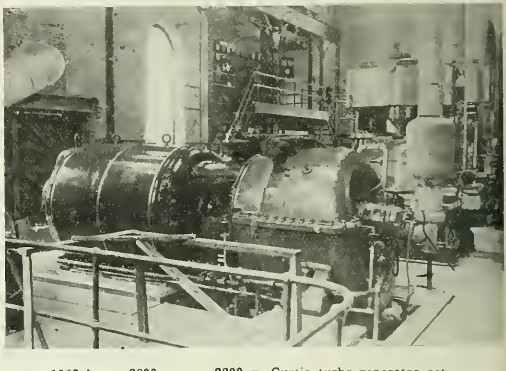
Acoustical Engineering

Acoustical engineering, as one of the developments of the immediate future which must play an important part in speeding up production and insuring American dominance in world trade was discussed before a joint meeting of the Cleveland Engineering Club and Electrical League of Cleveland, Thursday, at Hotel Statler, by Prof. Vladimir Karapetoff, head of the electrical engineering department of Cornell University. His address was featured by a practical demonstration of the results of an extensive investigation of audible and visible electric signals in industrial plants of different kinds and under varying conditions during the last year. The object of this research was the solution of the problem of taking up lost motion and frequently excessive time loss in factories of the more important sort in quickly locating departmental heads for conference requirements. He used in this illustration a klaxocator, an electrical code calling mechanism of the audible type. The appliance is entirely automatic in operation, once set by the operator. While the subject is one of constantly increasing interest to engineers it is primarily of vital importance to the manufacturer. With the growing demand for rapid-fire production, and the possibility of a shortening of the hours of labor in many lines, a more effective system of keeping in instant touch with every department and every departmental production head becomes more and more imperative. Prof. Karapetoff declares that big industrial plants in future must make this precautionary provision and that acoustical engineering will become one of the important sciences of industrial construction.

Lethbridge Adds 1563 kv.a. Turbo-generator

The Corporation of Lethbridge have recently installed in their power house another turbo-generator set of 1563 kv.a. capacity, 3600 R.P.M., 2300 volt, two phase. The set is arranged for condensing operation and runs in parallel with a 1500 kv.a. turbine and 580 kv.a. and 350 kv.a. engine-driven generators. The new turbo-generator is excited from d.c. busses, to which are connected a 50 kw. engine-driven exciter and a 30 kw. motor driven exciter. The turbine is of the impulse type with wheel casing split horizontally, the steam inlet and exhaust being in the lower half of the casing. The turbine and generator are connected by rugged tie pieces carrying the oil reservoir and pump. This arrangement is particularly adapted to allow free and uniform expansion, thus insuring accurate alignment. The turbine is operated at 150 lbs. steam pressure at the throttle and 90 degrees Fahrenheit superheat, with not more than two inches back pressure in the exhaust chamber of the turbine.

The condenser is of the Wheeler improved surface type with seamless brass tubes, with the Hotwell chamber bolted under the condenser shell. Radio-Jet air pumps and a ten-inch circulating pump of the centrifugal type have been installed. The usual accessories, including copper expansion joint, exhaust valve, relief valve and Cochrane steam separator make up the complete equipment for this unit.

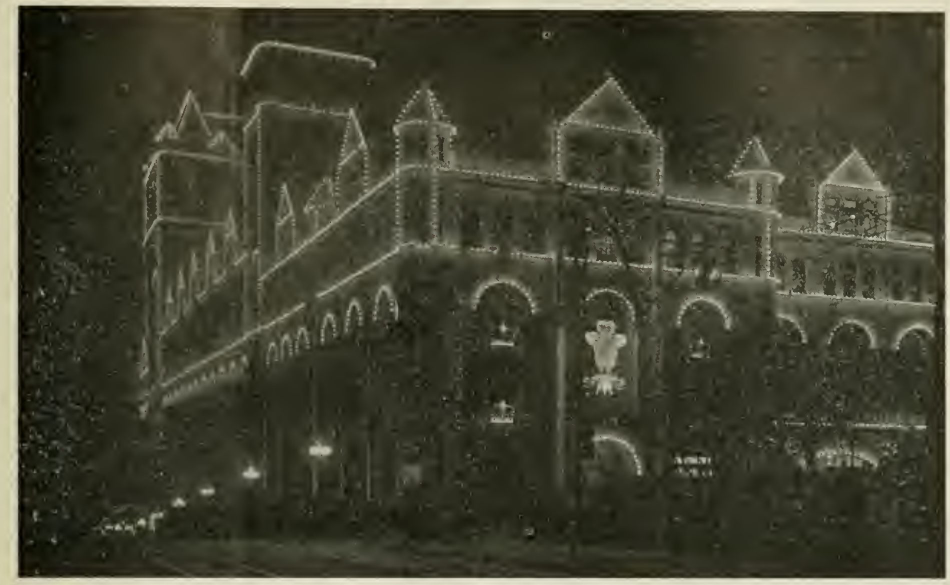


1563 kv.a., 3600 r.p.m., 2300 v. Curtis turbo-generator set, Lethbridge, Alta.

The whole equipment was supplied by and installed under the supervision of the Canadian General Electric Company of Toronto.—G. N. T.

You Have an Appointment on Tuesday Evening, November 25

Mr. J. M. Wakeman, general manager Society for Electrical Development, will be in Toronto on Monday and Tuesday, November 24 and 25. A general meeting of electrical men is being planned for Tuesday evening, probably at the King Edward Hotel, when Mr. Wakeman will give an address. More complete details will be announced later.



Montreal illumination for Prince of Wales' visit—C. P. R. Windsor Station

Windsor Station Illumination for the Prince

From the electrical point of view, the most effective and extensive scheme of decoration in Montreal during the visit of the Prince of Wales was at the Windsor Station of the C.P.R. The plan was designed by Mr. J. W. Bell, the superintendent of the building, and carried out by the Denis Advertising Signs Ltd. The work took six weeks to complete, and in order to wire the building and instal the lamps, it was necessary to use tackle, chairs and boats to reach the more inaccessible places.

The wiring used on three sides of the depot measured 1¼ miles and the lamps numbered 7,700. There were three main leads, three wire system, the power being supplied by the Montreal Light, Heat and Power Consolidated. In the Prince ot Wales Feathers, which were 13 ft. in height, there were 242 lights, and two maple leaves, each 12 feet high, contained 145 lights, while there were 55 lights in each of the four illuminated crowns. The lights were of 10 watts capacity. Four flood lights, each 1,000 watts, were employed to illuminate a large flag on the top of the tower. Besides the electrical decoration, there was a large display of flags, streamers and shields.

British Columbia Technical Association

The British Columbia Technical Association held its first banquet towards the end of October in the University Club, Vancouver. Due to the increased interest taken in the organization by all classes of technical men the executive planned to combine the business meeting with a social function and success attended the first effort in this connection. About a hundred representatives of civil, electrical, mechanical and mining engineering were present. Mr. E. G. Matheson, professor of civil engineering in the University of British Columbia, presided and, in the course of an interesting address, outlined the important functions which it had fallen to the lot of technically-trained men to perform in the modern world.

The development of industry and of the resources of the country was in a great measure, said the speaker, dependent on the work of technical men engaged in engineerang and allied professions. Engineering and scientific development entered into matters affecting the daily life of every civilized community to a degree which was not always appreciated.

It was part of the aim of the association to cultivate a greater measure of public recognition and improved status as applied to the work of qualified technical men, to establish some more definite basis for computing the value of technical service and also to further the interests of the community at large encouraging the employment of properly qualified men where work of an important engineering or technical nature had to be performed.

Prof. Matheson sketched the activities of tthe association and pointed out that, although the organization was only about eight months old, the membership was already 250, and a total of 300 was expected by the end of this year.

Following the banquet, business was transacted and this was followed by a musical programme. The secretary-treasurer of the association is Mr. R. Snodgrass, 812 Board of Trade Building, Vancouver, B. C.

It is stated that in recent tests at Erie, Pa., of a new gearless passenger locomotive, developed at the works of the General Electric Company, the electric locomotive succeeded quite easily in defeating two steam locomotives in a tug-of-war.

The Booth-Hall Electric Furnace

By W. K. Booth*

The principal difference between the various makes of electric furnaces is the method in which the power is introduced in the furnace. The general metallurgical operations of practically all electric arc furnaces are the same. The method of power regulation and bringing the power to the furnace frequently means greater or less cost in furnace operation and governs, to a considerable extent, the manner in which the furnace lining may be put in and consequently the refractory cost and the loss of time due to furnace shutdowns.

Electric arc furnaces may be broadly divided into two classes:—

(1) Vertical arc furnaces,
    (a) conducting hearth,
    (b) non-conducting hearth;
(2) Horizontal arc furnaces.

It is not the purpose, here, to enter into a discussion of the merits of the various types of arc furnaces, but more particularly to describe a new type of electric furnace which has been developed during the last year and which is known as the Booth-Hall electric furnace.

The Booth-Hall electric furnace comes under class 1 (a) above, and is illustrated diagrammatically in Figs. 1 to 4.

Fig. 1 is a longitudinal section of the two-phase electric furnace with the auxiliary electrode resting upon the charge and arcs drawn between the main electrodes and the charge. A pool of metal is shown forming on the hearth of the furnace.

Fig. 2 is a diagram of a transverse section of the two-phase electric furnace, showing the crossing action of the currents in the bath and the grids embedded in the hearth.

Fig. 3 is a diagrammatic representation of the electrical connections for the two-phase electric furnace employing two single-phase Scott-connected transformers. This diagram shows the connections from the transformer terminals to the main electrodes and to the auxiliary electrode and grids. A two-phase electric furnace so connected gives a balanced load on a three-phase power service. The auxiliary electrode is shown in black.

Fig. 4 shows diagrammatically the arrangement of main and auxiliary electrodes in single, two, and three-phase Booth-Hall furnaces. The auxiliary electrodes are shown in black.

The furnace is built either single, two, or three-phase to suit the conditions at the place of installation, the general principle being a furnace having a solid hearth which becomes conductive of electricity when hot, and the use of an auxiliary electrode which acts as a return for the electric current until the hearth becomes heated and conductive.

In starting furnace operation on a cold charge the auxiliary electrode is lowered until it rests on top of the charge, and the arc is then drawn between the charge and the main electrodes or electrode, as the case may be, the auxiliary acting as a return for the main electrode or electrodes. The auxiliary is so arranged that it presses with its entire weight on top of the charge and consequently no arc can form underneath the auxiliary; experience has demonstrated that no arc does form. The auxiliary is connected in parallel with the conducting hearth, and when the main electrodes or electrode have melted enough metal to form a pool on the bottom, the hearth becomes conductive and the auxiliary is withdrawn from contact with the charge. In a cold furnace the auxiliary is in operation from 30 to 45 minutes, and, in a furnace which is hot, less than 15 minutes; that is, only long enough to assure a positive start of the furnace and a balanced load on the power company's line.

Furnaces from ½ ton to 6 tons' holding capacity are generally built for two-phase operation, taking power from three-phase service by means of Scott-connected transformers, as shown diagrammatically in Fig. 3. In the hearth of the Booth-Hall two-phase electric furnace two sets of grids are embedded, which are electrically insulated from each other and are so related to the main electrodes that the current of the two phases cross in the bath, thus giving a maximum of circulation of the molten metal and causing, in conjunction with the effect of the bottom heating, a very thorough mixing of the metal in the bath. This action can readily be observed on looking into the furnace after the charge has entirely melted. The conducting grids are placed as far as possible from the heated interior of the furnace, and experience has shown that they never become overheated or require special cooling. The grids are so constructed as to handle large currents, furnishing large areas of contact with the material of the conducting bottom, and preventing local heating due to contact resistance.

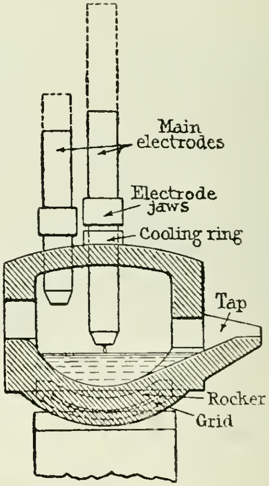


FIG. 1.—Booth-Hall two-phase furnace

By the use of the auxiliary electrode a positive start of the furnace is guaranteed, and there is no possibility of failure to secure contact. Each main electrode is independent of the other, as there are no arcs in series, and consequently the regulation of the furnace is very simple, giving a balanced polyphase load on the power service lines. As with the two-phase connection there are only two electrodes to regulate, this offers the minimum number of electrodes for a balanced polyphase load, and the smaller the number of electrodes requiring regulation the smoother becomes the furnace operation.

---

*Before Institution of Electrical Engineers.

The hearth is either acid or basic, as desired, and in each case is at least 24 inches (60 cm.) in thickness, being sintered in place layer by layer and forming a monolithic mass. By using the main electrodes in conjunction with the auxiliary, the materials of the hearth are sintered together in thin layers similar to open-hearth practice, thus forming a very durable bottom and making the danger of run-outs a minimum. The furnace hearth is consequently solid, with no water cooling of any kind. With the basic hearth, dead burned dolomite is used to maintain the slag line; in the acid furnace, ground ganister is used for the same purpose. The conducting hearth gives a uniform bottom heating of the entire bath, prevents sculls, and makes speedier and more thorough distribution of the heavier alloys, which tend to sink to the bottom of the bath. The effect of this bottom heating is considerable, and has been accurately measured on Booth-Hall furnaces in continuous operation.

With the two-phase electric furnace a minimum of electrode consumption is secured, due to the fact that a minimum number of electrodes for a balanced polyphase load is used. This means fewer electrodes to handle, less electrode breakage, and less surface burning. The loss on the auxiliary electrode is small, because it is in operation for such a comparatively short time. The electrode jaws are made so that the electrodes can be gripped or released by turning a handwheel or lever at the side of the furnace and it is not therefore necessary for the melter to climb on top of his furnace when changing the grip on the electrodes. The electrode jaws are arranged in segments so as to take up and adjust themselves to the inaccuracies in the surface of the electrodes.

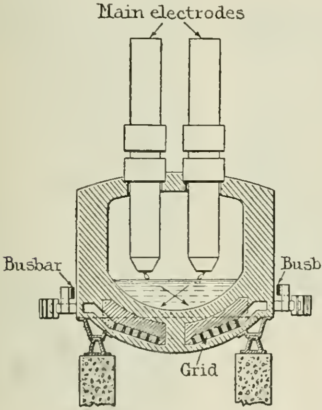


FIG. 2.—Booth-Hall two-phase furnace.

A roomy charging door of special construction is provided in the rear of the furnace and another door in front over the tap. This construction is very similar to the open hearth and permits a battery of furnaces to be arranged side by side and a charging machine to serve them all. The furnace tilts or rocks backward as well as forward, and slagging operations can be handled from either the rear or the front as desired. The door is designed so that it comes flush against the door frame, sealing the opening, and cannot swing open of its own accord. This prevents air getting into the furnace and also prevents excessive losses of heat through the door. The door can be opened anywhere from a few inches to full open when inspecting the bath, taking tests, or pushing scrap from the sides of the furnace into the bath, thus protecting the melter from the heat of the furnace and preventing great radiation loss. Any warping of the door or frame does not affect the operation of the door or its sealing of the opening when closed.

The furnace is motor tilted, in all sizes, for pouring, but is arranged so that it can be tilted by hand in emergency if the motor fails to operate. The smaller sizes of furnace are built for hand operation only, if desired. All parts of the tilting mechanism, including gears and motors, are arranged so that they do not come beneath the furnace and therefore there is nothing under the furnace than can be injured in case of a run-out.

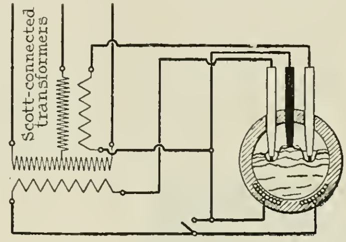


FIG. 3.—Electrical connections of Booth-Halt two-phase furnace.

The main electrodes are arranged for automatic regulation and also, in every case, so that they can be regulated by hand in case the regulators or motors should require repair.

The importance of power control is universally recognized, especially when refining operations are carried on. In the Booth-Hall electric furnace the power input can be maintained at any point from one-fourth to full load by means of proper voltage reduction and control switches.

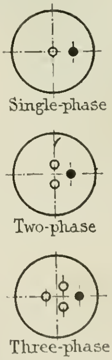


Fig. 4—Diagrammatic representation of electrode arrangement

In making steel for the ordinary grade of steel castings, the Booth-Hall electric furnace has operated with a power consumption as low as 446 kilowatt-hours per 2,000 lb. (906 kg.) of steel poured, but the average will be between 500 and 550 kilowatt-hours per net ton for continuous operation. In one of the 4-ton furnaces a considerable quantity of low phosphorous pig iron has been made running over 0.035 per cent. in phosphorous and sulphur, also special steels requiring refining with two or more slags, the power consumption, of course, depending upon the degree of refining required.

Water Power Resources of British Columbia

Comprehensive Report Issued by the Commission of Conservation of Canada — Coast Province Boasts 3,000,000 Horse Power

"Water Powers of British Columbia" is the title of a report upon this subject just published by the Commission of Conservation, under the authorship of its consulting engineer, Mr. Arthur V. White. The report is a very complete compendium of data relating to the water-power resources of British Columbia. Commenting broadly upon the report, we would say that it may be divided into four main sections. First of all, in Chapters I to VI, there is a statement of the guiding principles which should govern the conservation and utilization of inland waters, and a description of certain important features which should characterize reliable water-power data. These chapters also include a comprehensive historical survey of water legislation in the Province, together with discussions of subjects cognate there, such as the procedure to obtain water rights; electrical inspection; and the exportation of electrical energy.

The second main section, comprising Chapters VII to XIV, deals with the physical characteristics of British Columbia—its topographic and climatic features as they relate to the development of water power. A description is also given of the chief provincial developed and undeveloped powers, and there is included a very useful chapter dealing with surveys and maps of British Columbia. In connection with the topographic descriptions and power-site tables, the Province has been conveniently divided into five districts, corresponding to the main drainage areas, namely, the Columbia River and tributaries, Fraser River and tributaries, Vancouver Island, Mainland Pacific Coast, and the Mackenzie River tributaries.

The third main section of the report, comprising Chapters XV to XVIII, inclusive, presents in very compact form digests of stream-flow, meteorological and other hydrometric records.

What may be termed the fourth section, includes the appendices containing hydraulic conversion tables and convenient equivalents, a list of bench marks, and a comprehensive and classified bibliography. It may be remarked that, owing to the pains taken in the compilation of this bibliography of over 200 items relating particularly to British Columbia, one has here a ready guide to the literature relating to the history and natural resources of the Province. Classification is made under broad subject headings, as follows:

I. General reference works.
II. Guides, handbooks and other publications, giving descriptive information and historical data relating to various natural resources of the Province.
III. Topography—Government and other publications containing descriptions of the physical characteristics of various watersheds.
IV. Travel and Exploration—Mountaineering and other sport.
V. Histories and works of historical interest, including North West Coast Voyages, Hudson's Bay Company Affairs, International Waters, Bounaries, Treaties.

The report concludes with an unusually full index—a feature too often "sidestepped."

The Report in Detail

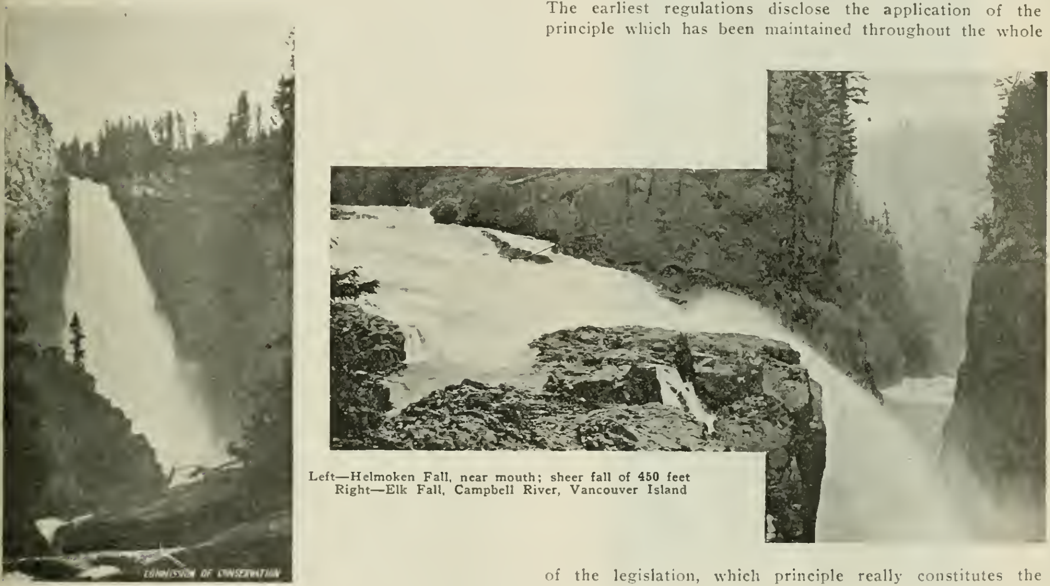
Too frequently in reports on water-power resources it has been the tendency to deal with power developed exclusively, without adequately considering such related subjects as domestic and municipal supply, agriculture and irrigation, navigation, fisheries and riparian rights. In this report, however, the author, although dealing with water-power resources, has recognized the fact that water power is but one of the important uses to which inland waters may be applied. This aspect of the subject is discussed in Chapter I, in which reference is also made to the paucity of information available, respecting British Columbia water powers at the time the Commission of Conservation, with the co-operation of the Provincial Government, undertook this work. The comprehensiveness of the report's outlook upon the water-power situation, as above indicated, may well be understood from a consideration of some of the sub-headings of this chapter, which deal with such subjects as: "Run-off and Forests;" "Water-Power and Agriculture," including a special reference to the necessity of conserving the underground waters; Water-Power and Irrigation," where, it is pointed out, that irrigation tends to the permanent settlement of the country, and that consequently, in the majority of cases, the use of water for irrigation will result in more widespread benefit than if otherwise used; "Water-Power and 'Navigation," where it is pointed out that power possibilities, under certain circumstances, are frequently regarded as of less, or as of only incidental, value, when compared with the interests of navigation. A list is here given of the navigable inland waters of British Columbia.

Under "Water Power and Fisheries" the serious consequences to the fishing resources resulting from obstructions which prevent the free passage of salmon and other fish is referred to as being vital in its bearing upon power development. The author points out that no development for power or irrigation should be permitted on any of the salmon streams without fully safeguarding the fishing industry. Under "Inland Waters and Mining," it is emphasized that the mining industry in British Columbia has exerted a marked influence upon the laws relating to the use of water-power and water, a fact to be expected on account of the important part which water and water-power have played in mining development. The important subject of the "Pollution of Inland Waters," is dealt with at some length, and reference is made to the pollution by factory and industrial wastes, including the serious damage occasioned by accumulation in streams of logging waste and other wood debris, such debris constituting a serious menace to bridges, public highways, water-power development, etc. As is well known, "Inland Waters Attract Tourists." and under this heading it is pointed out that where care is exercised to conserve scenic and sporting assets, such constitute an attraction for tourists, often a means of bringing much revenue into the country. Reference is also made to the important international character of some of British Columbia's streams and lakes.

Water Power Data

Chapter II of the report is devoted to a clear-cut discussion of water-power data. Consequent upon the great advance in the industrial arts which took place with the employment of steam, and which has been tremendously accentuated by the employment of electricity, there has been greatly increased demand for power, with the result that in recent years there has been a great stock-taking of water-power assets, especially by governmental agencies. It is emphasized that an accurate knowledge of the physical characteristics of various watersheds and of the basic physical factors will alone enable a proper estimate to be made of the potentialities of proposed developments. The effort required to secure these results takes time, and without such information a prospective investor is not in a position to form a sound independent judgment respecting some of the basic factors involved in any project that may be under consideration.

Naturally, water powers more easily developed, with good storage available and situated near centres of population, have the greatest value. The author points out that it is as necessary to differentiate between water powers as it is to differentiate in the case of agricultural lands, timber tracts, fisheries or any other natural resources varying in quantity, quality and situation. Examples are given to show how neglect to assemble rightly or to properly interpret essential physical data has been responsible for many serious financial and other failures.



Left—Helmoken Fall, near mouth; sheer fall of 450 feet
Right—Elk Fall, Campbell River, Vancouver Island

This chapter is replete with good counsel fortified by apt illustration, all presented with a view to protecting the investor against loss through embarking upon projects without making the proper preliminary investigations. A word is added counselling that the Government should make provision for flowage easement along the shores of lakes and rivers in order to prevent the erection of buildings and the carrying out of other permanent improvements on low-lying lands bordering lakes and streams; the contention being that it is generally cheaper to make such reservations than it is to settle claims for damages through flooding.

The Province of British Columbia has encountered exceptional difficulties in connection with the uses and administration of its inland waters. Indeed, no province of the Dominion has had such difficult problems to contend with. The chapter dealing with the provincial water laws gives an historical survey of water legislation in British Columbia, which is most interesting, even for those who have not the 'legal mind.' Commencing in 1858 with the revocation of the Royal License of exclusive trade issued to the Hudson's Bay Company, the author deals analytically with the various proclamations, regulations and acts, comprising over eighty separate enactments, down to the legislation now in force. Commencing with early colonial days, we note the provincial water legislation taking form in connection with early mining activities along the Fraser River and in the Cariboo district. There was little either in the common law of England, or in the statutes of older commonwealths which could adequately serve as a precedent for the solution of many of the problems peculiarly associated with the use of waters in British Columbia. The earliest regulations disclose the application of the principle which has been maintained throughout the whole of the legislation, which principle really constitutes the chief strength of the law. It has been termed the "Doctrine of Beneficial Use." Briefly enunciated, it simply means that any rights or privileges granted to a water user are forfeited if he fails to continue to apply the water allotted to him to beneficial use; the idea being that if the user does not employ the water beneficially, then he must step aside and allow someone else the opportunity of doing so. No one party is permitted to usurp rights to the exclusion of the rights of others. The law, as now formulated, deals with the use of water for mining, for municipal purposes, for irrigation, for log driving, for power, as well as for other purposes. The Province is, by law, constituted the owner of the water, and leases it out, under specified rental and conditions, for a term of years. By the development of its present comprehensive water code, British Columbia possesses one which, as the author states, "under wise administration, cannot fail to promote the welfare of the citizens of British Columbia and will, under the Canadian form of government, undoubtedly stand the test, alike of time and of all litigation that may be brought against it." Those responsible for safeguarding and transmitting the underlying principles embodied in this legislation from the early days to the present time, deserve the greatest credit.

The chapter includes a "Chronological Key to Water Legislation in British Columbia" and closes with a "Brief Memorandum Respecting Procedure to Obtain a Water License." The footnote and other citations of authorities in this and other chapters manifest the care with which the report has been compiled.

Electrical Inspection

Two chapters are devoted to electrical inspection. Chapter V deals with inspection by the Province. As development of electrical energy in British Columbia increased and accidents arising from its use multiplied, it was evident that steps should be taken to protect the public more adequately from such accidents. It was recognized further that companies should be protected from unjust claims made by injured parties; companies also sought protection from such pressure as might be placed upon them by municipalities desiring to impose restrictions upon operation which might prove unnecessarily onerous. These subjects are discussed, and there is appended an extensive list descriptive of the principal power installations which come within the jurisdiction of the Provincial Electrical Energy Inspection Act and of the regulations complementary thereto.

Typical natural mountain reservoirs. Anne and Joseph lakes on tributary to Indian river. Many small lakes at high elevation may be developed for storage.

In Chapter VI. is recorded an instructive survey of electrical inspection by the Dominion of Canada and of facts pertinent to the exportation of electricity. The history of these subjects is traced from the British North America Act of 1867, and it is shown how, when stringent measures of inspection were being applied to gas companies, those interested in the gas industry urged that the activities of their competitors from the electrical field should likewise be placed under regulation corresponding to the restrictions in force with respect to gas. The portion of this chapter which traces the evolution of the Electricity and Fluid Exportation Act is of special interest. It is shown how the forces operating to produce this legislation eventually found expression in the Boundary Waters' Treaty between Great Britain and the United States. This chapter comprises a critical study of such inter-related subjects as the International Waterways' Commission, Burton Act, Fluid Exportation Act, Boundary Waters' Treaty, International Joint Commission, and of the functions exercised by the Secretary of War, Washington, D.C., by the Department of Inland Revenue, Ottawa, by the Province of British Columbia, and by other organizations dealing with the subjects of the inspection of electricity and its exportation and importation.

Maps and Surveys

In connection with water-power development and the acquirement of lands and privileges relating thereto, those interested are greatly dependent upon maps embracing the territory involved. Sometimes it is difficult even to ascertain what may be available in the way of maps, or to which government agency application could most directly be made. In this report, Chapter VIII., commencing with the surveys of 1778 made by Captain James Cook, gives a brief history of surveying and mapping operations in British Columbia. Various detailed lists of maps are furnished, giving for each map the title, publication number, year of issue, scale and usually the approximate size. It is also shown from which branches of the Federal and Provincial Government services each class of map is obtainable.

Power Site Tables and Topography

There are six chapters, IX to XIV inc., devoted to topographic descriptions of portions of the Province and to the presentation of the tabulated water-power sites. First, the topographic and climatic features of the Province as a whole are indicated and discussed in their relationship to the distribution and characteristics of the water-powers of the Province. The purpose of this chapter is well expressed in its opening paragraph, which states:

> "To convey a satisfactory knowledge of the water-power possibilities of British Columbia, it is necessary to set forth the general topography of the province and the situation and character of the mountain ranges which so largely influence the climate and the distribution of precipitation."

The obtaining of an understanding of the prominent natural features is assisted by the physiographic map included in the report.

For purposes of presentation of the water-power data, the water-powers have been grouped under five main subdivisions: The Columbia River and tributaries, the Fraser River and tributaries, Vancouver Island, the Mainland Pacific Coast and adjacent islands, the Mackenzie River tributaries.

Each of the chapters consists of a topographic description of each district with, when necessary, a more detailed reference to individual watersheds. These descriptions are followed by the power-site tables.

The Report directs attention to the necessity of carefully weighing the statements made in Chapter X relating to "Description of Power-Site Tables," which applies to all the tables, and indicates the scope and limitations of these data. It is pointed out that in making the estimates effort has been made to keep on the conservative side. It is also pointed out that, owing to the fact that the confines of watershed areas and the run-offs from many of the similar streams are unknown, estimates in such cases can only indicate possibilities. The power-site tables involve some 600 streams, on some of which several sites are noted. On some streams, although no power-sites are definitely known, notes are appended indicating such information ,as is available. An index map accompanies the report, showing the positions of all the power-sites listed. The numbering of the sites follows a well defined order. The main stream in each case is first dealt with in ascending order, and subsequently the tributaries, also in ascending order. It will be found that reference is very readily made from the tab'es to the map and vice versa.

Stream-Flow and Meteorological Data

In Chapters XV and XVI, is given a concise summary of the available stream-flow data from a large number of stations, including several records made in the United States on international streams or streams in adjacent territory. The tables of stream-flow data have evidently been compiled with special care, looking to their serviceability for water-power studies. A useful index is supplied affording guide to already published data.

In Chapter XVIII there is a very complete assemblage of meteorological data. Preceding the meteorological records is an interesting discussion respecting precipitation and its measurement. Special attention has been paid to the subject of snow-fall measurement. Many valuable footnotes in this chapter direct attention to the more important publications relating to meteorological apparatus, methods and records. The chapter also includes an excellent illustration of the rain gauge of the Meteorological Service of Canada.

Maps, Diagrams and Illustrations

Two large special maps, one showing all the water-power sites, the other all the precipitation stations, accompany the report. Maps, diagrams, and well-selected illustrations, are employed to give the reader a broad outlook upon the subjects discussed and principles involved. For example, in Chapter IX, a physiographic map and accompanying description serve to convey a comprehensive understanding of the topography of the Province as a whole. Similarly in Chapter XVII, a series of well-executed diagrams with accompanying descriptions, shows the general trends and characteristics of both the hydrological and meteorological phenomena throughout the Province.

General Comments Respecting Water Powers of British Columbia

The water powers of British Columbia, owing to the exceptional physical features of the Province, possess a number of unique characteristics to which the report draws special attention. Speaking broadly, British Columbia is divided by the Coast and Cascade ranges into two regions climatically distinct. There is the Pacific littoral, including Vancouver Island, lying to the west of the summit of these ranges, and the interior region, lying to the eastward. The Pacific littoral region has a maritime climate, with heavy precipitation and run-off, and a moderate range of temperature. In many of its physical characteristics this territory resembles that along the coast of Norway. In this coastal region the mean annual precipitation varies from a little less than 40 inches along the narrow belt in the vicinity of the Strait of Georgia, where the mountain ranges of Vancouver Island exert their maximum influence to reduce the precipitation on their eastern side, to about 200 inches near Princess Royal Island, where the moisture-laden breezes from the Pacific have an uninterrupted sweep until they are deflected upward and cooled by the high, snow-clad mountains of the Coast range, resulting in heavy precipitation.

The powers along the coast are situated within a short distance of tidal water. The harbors are accessible at all times of the year. Plant operation troubles due to ice conditions do not exist. The report also explains that, particularly near the heads of the coastal inlets, the mountains are covered with snowfields and glaciers, some of which are of vast size. The melting of these, especially in the dry, clear weather of summer, materially augments the stream-flow available at times of insufficient precipitation.

The interior or easterly region has what may be termed a continental climate with much less precipitation, a greater range of temperature, and run-off characteristics differing substantially from those of the Pacific littoral. Within this area we have what is known as the Dry Belt, a region of deficient precipitation, extending, with some modifications due to local variation in topography, from the State of Washington to the Yukon. In this Dry Belt the mean annual precipitation, the report shows, varies from less than 5 inches to about 20 inches. Many of the streams, however, which traverse this Dry Belt gather their waters from valleys which penetrate deeply into the mountain ranges to the east and to the west, thereby receiving contributions to their flow from glaciers and snowfields. Numerous water-powers are available on such streams.

Typical view on coast stream. Power possibilities apparent. Canon creek, tributary to Toba river

Different From Other Provinces

The report, by drawing special attention to the factors of heavy precipitation, of glaciers and snowfields and of storage possibilities, both known and unknown, shows that many water-power sites, when fully developed, may yield several-fold the power that could be obtained from sites on streams in Eastern Canada appearing, upon casual inspection, to possess similar characteristics to those in British Columbia. Investigation frequently brings out marked contrast of characteristics. Thus it is difficult to make comparison between the total water-power potentialities of such a country as British Columbia and other areas, elsewhere situated, differing markedly in physical characteristics.

An examination of the data tabulated in the Report shows that the total estimated water-power of the Province is 3,000,000 horse-power, but of this amount about 500,000 horse-power cannot be considered, at least for many years to come, in the light of economical development, because of the proximity of railways, or possible interference with the salmon industry. The total available 24-hour power may be placed at about 2,500,000 horse-power. It must be remembered, however,—and this the report also emphasizes—that there is still considerable territory, especially in the northern part of the Province, to be more fully investigated. Therefore, taking into consideration also the fact that more storage possibilities will undoubtedly be discovered, we may in the future expect an increase in the known power of the Province. In considering the distribution of this power, it may be gathered from the report that the estimated water powers of the coastal region total approximately 1,000,000 horse-power, and the interior region 1,500,000 horse-power. Forty per cent. of the water power of the Province is therefore associated with less than twenty per cent. of its area. In the Railway Belt there is about 400,000 horse-power. With regard to the actual developments in the Province, it is noted that the installed capacity of the developed powers totals, in round figures, 300,000 horse-power, of which some 240,000 horse-power are in the coastal region, and 60,000 horse-power in the interior. About 125,000 horse-power of the developed power lies within the territory known as the Railway Belt.

Stream descending from Hanging Valley. Mackenzie fall, Hazel creek, Toba valley, 800 feet fall in sight

The coastal powers include the large developments in connection with the cities of Vancouver and Victoria, several pulp and paper mills and some important mining developments. In connection with the latter, the report points out that the Canadian Collieries, Limited, have found it profitable to make an important water-power development for the purpose of supplying power to operate their large coal mines. In the interior, the bulk of the water-power at present generated is concentrated at the three power houses of the West Kootenay Power & Light Company on the Kootenay River. The power supplies the mining district to the southwest and various municipalities therein. This power has specially contributed to the development of this part of the Province. The three largest developments at present existent are the British Columbia Electric Railways Company's Coquitlam-Buntzen development near Vancouver, with an installed capacity of 84,000 horse-power, and a head of 400 feet; the Western Power Company of Canada, with development on the Stave River having an installation of 40,000 horse-power, and a head of 120 feet; and the developments on the Kootenay River just referred to have a total capacity of 40,000 horse-power operating under heads of 70 feet and 34 feet. The highest head developed in the Province is one of nearly 2000 feet by the Britannia Mining and Smelting Co., at Howe Sound. The Jordan River development of the British Columbia Electric Railway Co., of Vancouver Island, has a head of 1145 feet.

No Powers of Large Size

Looking over the tables one is impressed with the fact that British Columbia is not conspicuous for water-powers of phenomenal size. There are but three or four sites with potentiality in the neighborhood of 100,000 horse-power each, and only an odd dozen of 50,000 horse-power or over. There are, however, some 50 known powers exceeding 10,000 horse-power each and a number of groups of power-sites on the same or neighboring streams which could by co-ordination be linked up to form systems aggregating considerably more than 10,000 horse-power. Doubtless, some of the sites at present rated below 10,000 horse-power may in the future, by virtue of the discovery of increased storage possibilities, be able to yield more than the present estimates.

The tables also reveal the fact that some areas of the Province are exceptionally well supplied with water power. For example, within 50 miles of Nelson there are water-power sites, chiefly on the Kootenay and Pend-d'Oreille Rivers, having an aggregate potentiality of 400,000 horse-power, of which about 50,000 horse-power has been developed. Again, within 50 miles of Vancouver, there are water-power sites aggregating some 300,000 horse-power, of which 90,000 horse-power is developed.

It is interesting to note that Vancouver Island, with its area of 12,600 square miles, is well provided with water-powers strategically situated. All along the Pacific coast there are hundreds of smaller mountain streams capable of furnishing cheap and readily developed small powers, from one to several hundred horse-power each.

When one considers the diversified nature of the natural resources of the Province, it is recognized that the water-powers of British Columbia have an exceptionally wide field of usefulness. The needs of municipalities, of electric railways, of manufacturing, of mining operations, of the forest resources, including pulp and paper mills, and of the electro-chemical industries, surely suggest great use for the water-powers of the Province, not to mention the probability that water-power may be more extensively used in connection with pumping for irrigation.

The only difference between a grave and a groove is the slight matter of depth.

Here's a Christmas Present for You

YOUR WINDOW DISPLAY IS YOUR BEST SALESMAN

Between now and Christmas the Electrical-Dealers of Canada will be putting forth their best efforts to attract the holiday trade and some fine window displays will be shown.

The biggest problem before the electrical industry to-day is not engineering or manufacturing—the real problem is "merchandising."

We believe that well dressed windows—goods properly and tastefully displayed and demonstrated—are the most effective means of increasing the sale of electrical appliances.

With a view to encouraging the art of window dressing among electrical contractor-dealers, and, also, having in mind the value of the interchange of good merchandising ideas, the Electrical News offers four prizes for best dressed windows, under the following conditions:

(1)	First prize	$35.00
	Second prize	20.00
	Third prize	10.00
	Fourth prize	5.00

(2) The contest is open to any electrical contractor-dealer, municipality or central station in Canada.

(3) Photographs of window displays must be in our hands by December 31, 1919.

(4) Explanatory notes up to 100 words may be submitted with each photograph.

(5) The merits of the photographs will be judged by an impartial committee of three—one manufacturer, one jobber, one contractor-dealer.

Plan now to enter the competition. You have an even chance to win a prize. In addition to that, however, it is a dead certainty that your effort to produce a better window display will be reflected in your more abundant Christmas trade.

Address photographs and all communications:

"Best Window" Contest,
Electrical News,
347 Adelaide St. W., Toronto.

The Contractor-Dealer

Factors Which Determine the Success of a New Store—Getting Under Way and Choosing a Name — The Dealer's Own Home Should Be Completely Equipped

Mr. E. A. Drury, one of the best and most favorably known electrical contractors in Toronto, has just opened an attractive store at the corner of Oakwood Avenue and St. Clair Avenue. This is a rapidly growing district and a location well able to support a first-class electric store. Mr. Drury is already well known to the people of this district, having lived a few doors from the new store for some years, where he carried on a wiring and contracting business.

Since the organization of the Toronto electrical contractors Mr. Drury has been one of the most enthusiastic and helpful members of the Association. He is full of good, snappy ideas, places them before his fellow-members in clear, forceful terms, and then, best of all, works energetically to carry them to accomplishment. He has the best wishes of his fellow-members for the highest success in his new venture.

In planning the details of a new store there are many things to be taken into consideration—location, publicity, salesmen, service, etc., etc. One point about Mr. Drury's store location is its proximity to a very popular "movie" theatre. In this connection a very helpful article appears in a recent issue of the Journal of Electricity, written by M. J. H. Moseley, formerly advertising manager for the Western Electric Company. Since this article has a direct bearing on the question of Mr. Drury's new store, we quote as follows:

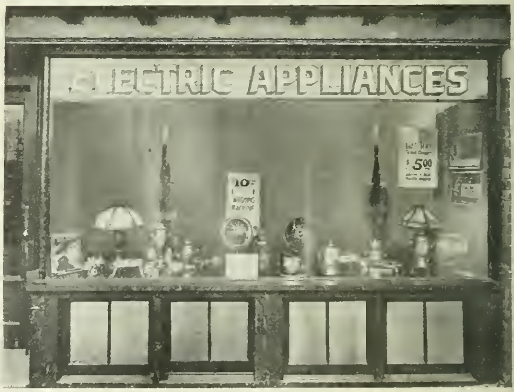
Since I must have a place of business, the first consideration is the location of my retail store. The two factors involved are (1) rent, and (2) accessibility. I shall pay as much rent as I can afford, based on a certain estimated volume of business. Having determined my maximum rent figure, I shall pick out the most accessible location I can secure for this amount of money.

In choosing a location it is a good idea to take a plot of the town, regardless of the size, and determine on which side or in which portion of this town are the greatest number of prospective customers. Furthermore, which side of the town is most likely to grow fastest. Having decided this, the question of location is half solved. The problem can be limited still further by dividing that half of the town selected into two parts. This will give a small sector of the business portion in which I shall try to locate. In what part of this section shall I try to secure a place? If my rent allows, I shall select a place near a moving picture show, a successful confectionery store, or any other prominent concern which advertises liberally. A location near a moving picture show is good on account of the ability to make night window displays to a good audience.

Let's assume I have secured a location near a moving picture show. The next question is, what shall I call myself and how should I make my store stand out as the most prominent one in the block?

Jones is a plain name, so suppose I decide to have my firm name "Just Jones." This can be interpreted in two ways; first, as meaning just ordinary, plain Jones; and second, as meaning "Just" Jones, giving the idea that I am absolutely just in all my dealings. It would be different from the ordinary name of "Jones Electrical Company" and would have an individuality to it.

Now, the chances are that my neighbors in a town of the size mentioned would have rather elaborately decorated window signs, consequently in order to get contrast, suppose I simply letter "Just Jones" in two or three-inch gold letters on the window glass either side of my door, paint the store front a prominent color to contract with the others in the block and have made up a neat electrically-lighted sign with the name "Just Jones" on it.



Exterior view and window display—Mr. E. A. Drury's store, Oakwood and St. Clair, Toronto

I will, of course, want to use the same name on my envelopes, letterheads and billheads; and by all means these should be printed in the same kind of type as that used on the show window and electric sign.

I am now ready to open my store and put my wares before the public. The ordinary merchant would probably insert a full page ad in the newspaper and possibly send out circular letters to a selected list of friends. Consequently, in order to be individual, I shall secure some special yellow envelopes with my imprint thereon. these envelopes to resemble as much as possible the ordinary telegraph envelope. The inserted message might have the same heading, and read like a telegram.

In the lower left-hand corner on the message sheet should appear a small illustration showing a plot of several blocks of the town, with an arrow pointing to Jones' location.

If this message is printed in the same manner in two or three issues of the local paper, the chances are that the combined publicity will result in quite a few people visiting my store during the opening week. From these visitors a considerable number of leads should be obtained, to be followed up later by a salesman.

The Daily Drive for Business

I have now opened my store and am ready to start a hard every-day drive for business.

Here are the kinds of business I am going after:

1. Home wiring and fixtures.
2. Commercial wiring and motors.
4. Lamps.
5. Household appliances.

Home Wiring and Fixtures

Where does this class of business originate? There are two classes of buildings on which to work:

1. New buildings.
2. Existing buildings.

Contracts with new homes can be made best through:

The Real Estate Man,
The Architect,
The Contractor and Builder,
The City Building Permit Records.

Now, where shall I start in order to get this business?

Charity Begins at Home

Without a question the first place to start is at my own home. My home should have everything in the way of modern wiring and fixtures, so that I can actually show prospective customers the utility of having receptacles in the proper places, and the decorative effect of having the right kind of fixtures.

If, through force of circumstances and lack of capital, I cannot equip my home in this manner to start with, then I shall pick out several prominent homes in the city and work very hard on them until they are equipped in a proper manner. I then shall have examples through which to sell my other customers.

The best kind of advertising, and that which makes the greatest impression, is the citation of particular and specific facts. For example, when I have finished up a particularly nice job of house wiring and fixture installation, here is a chance to send a circular letter to my entire mailing list of real estate men, architects, builders, etc., calling attention to the fact that the house in question has just been wired and illuminated by me and suggesting that they go around, and see it at the first opportunity. Existing homes which offer prospect of new fixture installations and changes in wiring can gradually be listed for use in the manner suggested above.

Another opportunity of keeping in contact with such prospects is to send them a short letter, notifying them of the receipt of new fixtures, attaching, if possible, a circular illustrating the fixture in question. Almost everybody is glad to keep pace with the times and will appreciate attention. Such letters may not result in actual orders at the time, but eventually they are going to have the desired effect. I will not send out a letter unless I have something to say. This is a simple rule which if followed will surely bring success.

Commercial Wiring and Fixtures Next

Where shall I start on my commercial wiring and fixture business Once more it is necessary to have an example to start with, and my own store is the best example I can have. It might be a good idea to design the fixture plan of my own store so that it can be changed occasionally, looking new and up-to-date at all times.

It will be easy to build up a mailing list of all the stores in town needing re-designed fixture installations. Here again the mailing list will come into use every time I re-design the fixture installation in any store, or wire a new store.

When I fix a new store window for some one, I shall work to get as attractive a display as possible, and it might be advisable in such cases to actually check up the number of people passing and the number who look in, using this data in a letter to other prospects.

Following Up Prospects

Prospects for industrial wiring and motors can also be built up into a mailing list. This mailing list can be utilized in a manner similar to the other mailing lists noted above. While such a list may not contain, for a small town, more than 10 to 50 names, nevertheless it will be worth while to have it.

A partial interior view of Mr. Drury's new electrical store

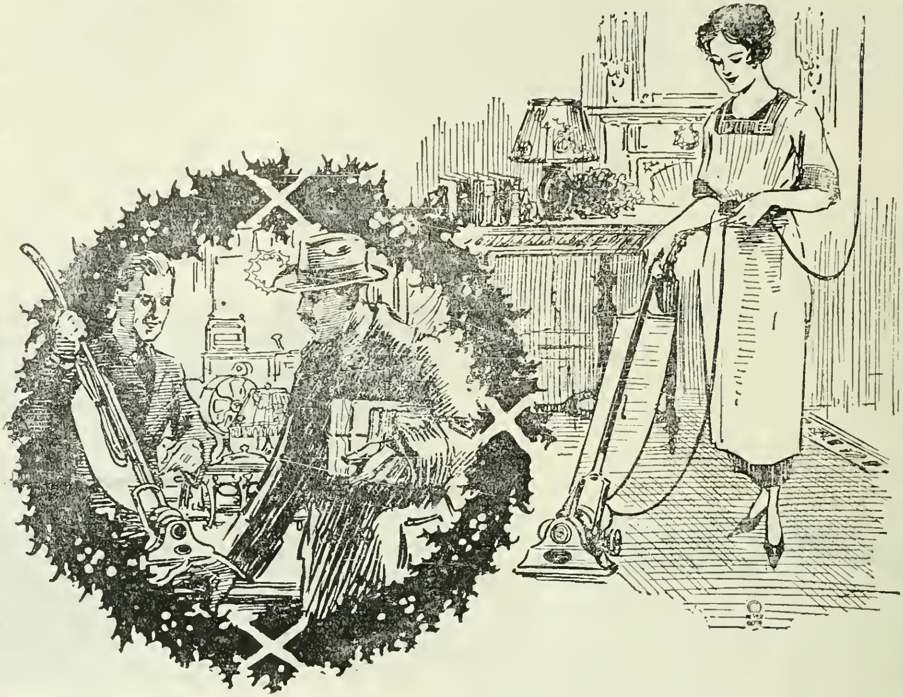
The best way to start this business successfully is to start a service system for taking care of the motors already installed in the neighborhood. This might be called "Just Jones Motor Service," and would consist of the cleaning and oiling of all motors of a customer once a month for a stipulated sum. This sum must be set for each customer and should be sufficient to cover the cost of doing the work, the cost of the oil, and a small profit. I will find that the leads obtained from a service of this kind will be of great value, because by monthly contact I am sure to know when a man is contemplating the installation of an additional equipment.

In making my bid on this equipment I can well afford to include service for a period of six months or a year. This would be a strong factor in fighting competition.

The moving picture shows perhaps lead most businesses in the way of exterior illumination, consequently here is a place to start for lamp business.

Other stores having electric signs are also good prospects, and this business should be built up on a service basis entirely.

My desire is to get my customers to sign up with me for lamp service for six months or a year at a time. During this period I shall make it a point to look at their electric signs at least two or three times a week and their lamp stock at least once a month.



Can You Think of Anything Better Than

AN ELECTRIC SERVANT

Whatever you choose:
IT is Sfae.
IT is Sanitary,
IT is a Labor-Saver,
IT is Moderately Priced.
IT is Attractive in Appearance.

Electrical appliances transform the drudgery of housework into the joy of congenial recreation.

Toaster, Fan, Iron, Percolator, Vacuum Cleaner, Washing Machine, and a host of Other Things—all prices—all useful.

Shop Early—We'll hold them.

THE ELECTRIC SERVANT SHOP

Advertisement Suggestion for the Christmas Season

Developing New Business

By W. S. Byrne*

We find ourselves confronted to-day by a problem which becomes increasingly difficult as time passes. Construction, reconstruction and development expenses mount apace while our economies in manufacture have apparently reached that point at which little improvement can be expected from the introduction of new methods of manufacture or increased efficiency of apparatus. Our rates of return, too, in the vast majority of instances remain as in the pre-war period. But we must progress, and we have before us but one means of meeting the exigencies of the situation—new business.

Increase Volume of Business

We must secure an increase of volume which will reduce in proportion the cost of production and operation. We must make two kilowatts grow where but one was before. New sources of outlet and income must be found, and when I say "new" I do not necessarily mean only new purchases, but increased use by existing customers as well. Probably in many instances, new products must be marketed or our present commodities or service must be marketed in a new way.

It has been the experience of our company that the sale of merchandise can quickly be made, with a little intensive effort, 15% of the former income to the property. Putting this statement in a different way, it can be said that the merchandise business of a community of about 200,000 can very readily be made approximately $1.50 per capita. In small communities, the income per capita should be correspondingly higher as a result of more direct contact with the purchasing public. This is not a matter of theory—it is exact fact brought out through analysis of our operation in small and large communities.

The public, however, can only be sold after your organization is sold. Acting on this principle, we were able in the month of March, this year, to show an increase of 72 % over the preceding month, and a 12% increase in April over March.

This condition is being maintained and is no sporadic peak. It is the healthy condition of our business and market. These facts are proof of the truth of certain principles. First, irrespective of selling price and discount to the dealer, there must be selected types of appliances to be sold in which you have confidence and on which you are willing to stake the good name of your organization. Select that washing machine and vacuum cleaner which will unquestionably give service to the user and can be known in your community as the best device of its kind sold.

Second, secure from the manufacturer of these appliances the services of one of their factory experts who not only knows the quality and workmanship of the device in question, but who can bring the story home to your sales force, your repair force and in fact, your entire organization. Convince them that this is the appliance they should use in their own home and make it attractive for them to use it. Derogatory comment by a repair man can un-sell more appliances in one hour than your sales force can put out in a month.

Third, be prepared to give service on these appliances which is expert and rapid.

Fourth, demonstrate these appliances to the user until she or he is unquestionably versed in their proper use.

Fifth, bear in mind the fact that if you have not been merchandising in a broad way, it is necessary to overcome the fly wheel effect of your organization against the progress of merchandising, and you must offer at least initially to the public, and to your organization, inducements which will convince them of the necessity of purchasing or selling these appliances.

Planning the Campaign

When I say, offer an inducement to the public, I do not have in mind promiscuous price cutting. The successful and profitable policy is to sell at list prices, but since we are not essentially merchants, we can well afford to study the methods of the department store merchant in the same way in which you would expect him to study your methods in the manufacture of electrical energy.

In the opening campaign, you will find that it will probably be necessary to offer some nomical cut in price on some device or an improvement in payment terms, and some monetary inducement to your entire force to stimulate sales.

"Nothing succeeds like success." Carefully select the device for your first campaign. Plan the campaign, its advertising and the details of its conduct in such a way as to secure big results. This having been accomplished, the pioneering is over. Now keep eternally at campaigning.

On one particular device, we found it necessary to increase our selling price as a result of the termination of a pre-war contract. Before putting into effect this increase in price, we advertised and made it known through our organization, that due to this condition, it would be necessary for us to increase the price of this device on a certain date. As a result of this statement and our advertising, our sales in this particular line increased about 25% over previous sales. Following the change in price, and for the purpose of instilling confidence in our organization as well as putting over the new price, we conducted a two weeks campaign at the increased price but made a reduction in the monthly payments when sold on the deferred payment plan. These new terms were advertised, the sales force went out with renewed vigor, and in spite of the increased price which was over 12%, we were able to increase our sales during the two weeks campaign to a point where they exceeded the sales of the former campaign by about 50%.

Public Like Deferred Payments

Another fact which may be of interest and which our experience has brought out, is that the public generally is satisfied to pay an additional price or carrying charge for purchases on deferred payments. We are making a difference of from 7½% to 12% in the selling price of our appliances sold on the time payment plan.

Persons who desire to purchase on this basis are reconciled to that fact. They generally realize that the protection is due you, and the unqualified statement may be made that the cost of carrying these accounts can be charged to the purchaser in this way and meet with his approval.

If you are selling a device which you know will give satisfaction and in which your sales organization has confidence, it is unnecessary at this stage of the public's familiarity with the appliance, to demonstrate it in the home before purchase.

During the months of March and April, we were able to save $1,200 expense incident to the delivery and damage of washing machines and vacuum cleaners resulting from permitting them to be used in the home, by insisting that with our guarantee we knew that if the prospective customer was interested in the purchase of a given device, he could afford to make the initial payment or buy the machine outright before having it delivered to his home for use.

Now as to the matter of new business resulting from the increase in the sale of our service. Many of the factors that caused us concern in our industry are pinching the toes of our prospective customer, and we may, as a result, secure audiences and consideration where the prospect has heretofore been adamant.

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*Before N. E. L. A. at Nebraska.

Increase in Rates

It is a generally accepted fact that even where increases in rates have been secured, the increase has not been in direct proportion to the increases in manufacturing expense. This fact, your local miller, elevator man or pumping station, may not realize. It is certainly most timely that new proposals and new estimates of the customer's present expense should be brought to his attention.

Business generally is in the most prosperous condition it has known for years. Men are more concerned in their operating conditions and are more cunning in their efforts to effect economies than ever before. In the vast majority of cases petty prejudices and former apparent high costs can be set aside through the active solicitation of power business, particularly. You are warranted in redoubling your efforts, and judging from the experience of numerous central stations, your success is practically assured.

Mercantile institutions are presenting their wares, and are operating their establishments in a way hitherto unthought of. Lighting is one of their best invitations for the customer to purchase. Let us cash in on this condition. We build not for to-day. The saturation point is a thing unheard of to the consumer. Let us, therefore, make known our wares, apply our fullest energies, and reap the harvest at hand.

Starting Things With a Plan*

When a man builds a house he first has a plan. In building a business, the better and more thorough the plan, the bigger and better will be the resulting business. And in building any branch of a business a plan is just as necessary.

We recently demonstrated this to our complete satisfaction. June and July had always been slow months with us in vacuum cleaners. To give our ideas a thorough test we decided to run a vacuum cleaner campaign in this off-season and at the same time to lay the foundations for a bigger and better vacuum cleaner business. So we laid out a plan covering the use of all kinds of advertising at our disposal—our windows, movie slides, circular letters, generous newspaper space, and a good salesman. Here is the schedule:

June 12th—Windows trimmed. The trim announced that a vacuum cleaner would be sold to the highest bidder.
  Movie slide started in the local theatres to run every night.
  A 22-inch single-column ad in both daily newspapers.
June 14th—First circular letter mailed to 300 cleaner prospects.
June 17th—A 2-column 20-inch advertisement in both newspapers.
June 21st—A 2-column 20-inch advertisement in both newspapers.
June 24th—A 3-column 22-inch advertisement in both newspapers.
July 2nd—A full page advertisement in both newspapers. Reproduction of this advertisement mailed to the 300 prospects.
July 7th—Third circular letter mailed to the 300 prospects.
July 10th—A cracker-jack salesman secured from our jobber started his calls on the prospects.

During the week of July 10th we sold 25 vacuum cleaners, which is as many as we had sold in the past two years. Our sales up to August 1st amounted to 50, and we expect to sell somewhere near 150 before the year is over. Considering that our town has only 4,000 to 4,500 people, this will be a fair record for the first year.

It takes faith to spend money for a campaign like this, because the immediate returns will barely pay the expenses of the campaign. In laying out the campaign and paying for it, I kept constantly in mind that I was not after immediate sales so much as future business. I am thoroughly satisfied with the results—we are now known as the vacuum cleaner house.

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*By R. A. Jeffirs in "Contact."

Put "Momentum" Into Your Sales Effort

The following account is given of an occurrence during some repair work recently carried out in a western town. It illustrates the value of "momentum."

At the point where repairs were being made a corner pole was anchored to a rock in a field, partly buried in the ground. A colt grazing in the field was frightened by an automobile and started on the run. He hit the guy, lifted the rock which weighed at least half a ton, and threw it about 7 feet, breaking several circuits.

The colt was uninjured. Under ordinary circumstances, it would take two horses to move the stone and the workmen were unable to understand it. The superintendent said there were two agencies connected with it, colt and momentum. "That's just what many of us want—more momentum if we expect to accomplish anything really worth while!" he adds.

Live Wires Hold Their Annual Meeting

The third annual meeting of the Vancouver Electrical Contractors and Dealers was held last month in the Citizens' Club, Vancouver, B. C., There was a representative attendance with President E. Brettell in the chair. The election of officers for the ensuing year resulted as follows—President, E. Brettell, re-elected; executive council—Messrs. S. E. Jarvis, H. B. Rankin and C. H. E. Williams. Those present were afterwards entertained to dinner followed by a number of interesting addresses. Mr. George E. Kidd, general manager of the British Columbia Electric Railway Company, spoke on impressions of his recent visit to the old country. Mr. R. P. S. Twizell had something of interest to say on architecture in its relation to electricity, and Mr. H. Mercer spoke on electrical engineering. Capt. W. J. Conway declined to accept the secretaryship for another year; this matter will be dealt with at a subsequent meeting.

Trade Publications

The following new literature has been received from the Ingersoll-Rand Company, 11 Broadway, New York City, N. Y. Copies free on request:

Form No. 8707.—This is a forty page, 6 x 9 in. bulletin, on "Little David" pneumatic drills, grinders and saws; illustrates the various sizes and models of the different machines and contains detailed description concerning the particular tool to use for a given purpose. The descriptive matter is supplemented with a number of tables giving air consumption of the various tools, etc.

Form No. 945.—"Tis a Good Investment" is a subject of an 8½ x 11 in. form illustrating ER and FR compressors in small machine shops, power houses, garages, etc.

Form No. 954.—An 8½ x 11 in. sheet descriptive of the "Air Lift Method of Pumping."

Form No. 9029.—Is the Ingersoll-Rand Company's Pictorial Products catalog; virtually a picture book, illustrating and describing practically the entire line of products marketed by this concern.

An Attractive Winnipeg Store

Stock Conveniently and Prominently Displayed—Prices in Plain Figures—Business Rapidly Outgrowing Capacity

One of the most up-to-date electric shops in Western Canada is that of the Electric Appliance Company, situated in Winnipeg's busy down-town district on the corner of Notre Dame and Portage Avenues. This concern, as the name indicates, has confined its efforts particularly to specializing in the sale of electric appliances. That this endeavor to specialize in appliances exclusively has met with success is evidenced by the statement of manager G. F. Weir, that the store is not large enough to take care of the rapidly increasing volume of business.

There are no frills in the methods of merchandising which have contributed to the success of this business. When a customer enters the door he is at once impressed with the cordial greeting, the crisp business atmosphere prevailing and the desire on the part of the sales force to display and fully explain in plain English, without resorting to technicalities, the various merits and uses of the different articles of merchandise. Whether a customer makes a purchase or not he is bound to leave with a most favorable impression, which should be a big factor in determining where he will place his patronage when his mind again turns to things electrical.

The stock is conveniently and prominently displayed on tables and showcases within easy reach of the customer, and giving every possible opportunity for the power of suggestion to prompt investigation and purchases. As will be noted in the photograph of the interior, the various classes of electric lamps are displayed on a rack on the wrapping counter with prices of each in large figures. This practice of plain figure marking is carried out on all articles. What has proven to be one of the greatest aids in the sale of the innumerable small articles handled in this business is the fixture shown standing behind the counter. This follows the line of display used extensively in hardware establishments where a series of small drawers contain the articles, while a sample of each one, with its price, is attached to the outside of the drawer, and in full view of the customer.

Attractive display of the Electric Appliance Co., Winnipeg. Attractive show cards help to tell the story

A small display space in the daily press is used consistently for announcing special articles as a store sales' feature for several days' selling, while the window display is worked to one hundred per cent. capacity, with frequent changes of display, attractively arranged, and proves to be a remarkable business producer.

Interior Electric Appliance Company's store, Winnipeg. Goods conveniently and prominently displayed on tables and in showcases

Be a Business Builder

It is one thing to be a salesman and another thing to be a business builder. Certainly every progressive man desires to be and should be a business builder. Unfortunately, however, a great many of us are too apt to merely take the order and fall into the class of mere salesmen by not giving proper consideration and time to the necessary demonstration and servicing of the article sold.

There are at least three distinct steps in every completed sale. The sale, the demonstration and the servicing of the article sold.

In the disposing of more technical apparatus, the importance of demonstration may be lessened because the people to whom you sell have the necessary knowledge to use the article as it should be used.

This course, however, cannot be followed in the sale of the more commercial products.

One of the greatest evils of the day in the sale of electrical appliances is the lack of sufficient attention to demonstration, and quick and competent servicing. It is just as much the duty of every salesman of such apparatus to demonstrate it as it is for him to take the order. The greater the advantage of the appliance, the greater attention due the details from a standpoint of demonstration.

There is just as much difference between ironing with an electric iron and ironing the old way as between driving a horse and buggy and an automobile. This is equally true of all the appliances and it's up to you, as business-building salesmen, to get this idea across to your customer, whether he be central station, agent, jobber, dealer or individual customer. If you don't know how to demonstrate the article, find out.—The Circle.

Toronto Contractors Hold Successful Meeting

A splendidly attended supper meeting of the Toronto Electrical Contractors was held on the evening of Thursday, Nov 6, the president, Mr. Kenneth A. McIntyre, in the chair. This was the first meeting since the trip to Buffalo, and the members were enthusiastic over what they had seen and heard, and expressed themselves quite freely as having gained a number of good merchandising ideas that they were since putting into effect.

The Morris plan of financing instalment payments came in for considerable discussion. It seems to be an established fact that the best results in retail electrical merchandising can only be obtained by distributing payments over a considerable period. Such a plan, however, is too great a tax on the finances of the average contractor-dealer. The result is that there are too few electrical stores and the merchandising of electrical goods is being handled, badly for the most part, by retailers in other lines. Mr. Carthy and Mr. Drury were appointed a committee to look into the matter in Toronto and report whether any of the banks or loan companies would look with favor on any scheme of financing for the members of the Toronto association.

Mr. McIntyre, early in the evening, mentioned to the members the advisability of joining The Electric Club of Toronto and attending their weekly mid-day luncheon-addresses. It is typical of the broad-minded outlook of the Toronto contractors that about two-thirds of the members joined up on the spot—and the others are coming. The collection of the fees was greatly facilitated by the presence of Mr. C. H. Hopper, treasurer of the Electric Club, whose gratitude, later in the evening, found expression in a neat little speech full of humor and wise counsel.

Capt. R. T. Smith Joins Benjamin Co.

Captain R. T. Smith has been appointed in charge of sales promotion work for the Benjamin Electric Manufacturing Company, Toronto. Captain Smith has had a wide experience in electrical matters, for a number of years with the old R. E. T. Pringle Company, of Montreal; later, from 1907 to 1912, he was with Mr. Irving Smith, Montreal, as manufacturers' agent, and for the next two years covered the province of Saskatchewan for the Canadian British Engineering Company, where he was working up a fine trade, when the war broke out, and he enlisted as a gunner with the Canadian Field Artillery. Captain Smith saw five years' service, practically all at close range.

The Benjamin company are conducting a vigorous campaign, which is meeting with splendid success in placing their well known products in the hands of the consumer. Mr. F. J. Allen, general manager, states that factory managers, in general, are much more appreciative than formerly of the value of good lighting in increasing both, quality and quantity of production. Benjamin equipment is contributing very materially to this end.

Hardware Store Sells 32 Volt Iron for 110 Volt Service

"Contact" prints a letter from the manager of a municipal lighting plant which throws an interesting sidelight on the conduct of an electrical business by a hardware store.

"I have charge of the light plant here.

"The light plant does not sell electrical appliances. Two hardware stores sell electrical appliances. They do not push the sale of them any.

"I believe they could sell electrical goodis if they would take a little interest in showing them off and trying to interest people in them.

"I know I could sell appliances if it were not for making the other fellows sore, which would not do as they are on the town board and this is a municipal plant. I have been a subscriber to "Electrical Merchandising" since it was issued.

"This town, like a good many other towns who have municipal light plants, have let their plant run down, until it is a badly losing property. If they would put in a couple of new engines and push the wiring of houses and then push the sale of electrical appliances they could have a paying electric light plant.

"To show you how much interest the hardware stores take in the sale of appliances I will describe an incident. I have been called on two or three times to put in new fuses in houses. When I would ask them what they were doing when they blew the fuse they would answer, "I was just trying to use my new electric iron.' On examining the iron in two different cases I found them to be 32-volt irons. Can you beat that? Not taking enough interest in the sale of the iron to see whether it was the right iron to use on 110 volts or 32 volts."

Extensive Co-operation for Entire Industry for the Holiday

There is a point in holiday selling that the retailer frequently overlooks. It is the fact that, in spite of natural increase in buying by the public at Christmas time, selling pressure should be kept up at that time and the retailer should add to his force and his stocks, if need be, to capitalize the holidays to the utmost. Because while the public is liberal in opening its purse for buying at Yuletide, it ties up the strings immediately after Christmas and there is usually a "valley" following the peak of holiday purchasing.

As announced in our last issue the Society for Electrical Development has developed an extensive Christmas campaign for making the coming holidays more profitable for the retailer, and to help make him provide against the post-holiday drop in buying by building up a good reserve.

The underlying "theme" or motive of this campaign is to make this another "ELECTRICAL CHRISTMAS," which idea is brought out forcibly in a beautiful poster design, lithographed in seven colors. This can be hung in windows, on doors and in the store. The same idea is dominant in the window-cards, poster-stamps and price-cards, all of which show the poster. Constant reiteration of this "theme" will have a favorable effect on the shoppers, if the retailer will use all the sales helps consistently.

Another notable fact about this campaign is that the Society does not limit all the co-operative help to members exclusively but distributes certain things to non-members as well, without charge. The scale of prices for the various material was published in our last issue.

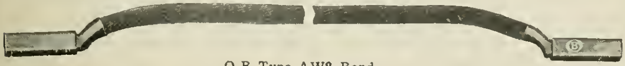
Siemen's Representatives Visit Canada

Messrs. F. H. Leonard and W. B. Hopkins, of Siemens Bros. and Co. Ltd., London, Eng., have been on a visit to Canada, in connection with a 14 months' tour of the world investigating trade conditions. The company is represented in Canada by the Siemens Co. of Canada Ltd. of which Mr. C. W. Stokes is manager. Messrs. Leonard and Hopkins report that there is a very large demand for electrical equipment of all kinds throughout the world, especially in South America.

Advise your customers to keep all lamps and all reflectors clean. The loss of light due to dirt on bowls or reflectors may amount to as much as 60 per cent.

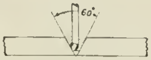
New O-B Arc Weld Bond for Electric Railways

Electric welded bonds are growing in popularity because when they are properly installed they are mechanically and electrically permanent. The Ohio Brass Company of Mansfield, Ohio, has developed an arc weld bond that makes it easy for an operator, after a reasonable amount of practice, to get a good job at every joint. The bond is made in two types—AW 2 and AW 3. Essentially these two types are alike. The body is of copper strand and the terminals are copper protected by a steel sleeve. This steel sleeve is mechanically and electrically united with the copper in the factory. On the job the operator welds "Steel to Steel with Steel"—the easiest kind of electric welding. Another fundamental arc welding principle is embodied in the bond in that the weld is built up in a 90° angle. Experts have found that in order to get a good weld between two parts being joined, the arc must be played into an angle of not less than 90°. Otherwise the arc will play against one side of the groove and will not effect a real union in the bottom of the weld, the important place in rail bonding.

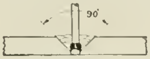


O-B Type AW2 Bond

O-B Type AW3 Bond



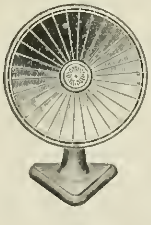
In an acute angle the arc plays against one side and misses the bottom of the scarf



In a right angle the arc makes a good weld down in the corner

Handsome "Universal" Heater

A very attractive heater of the reflector type is being distributed by the Canadian General Electric Company. The unit is one of the "Universal" products. As shown in the illustration, the base is triangular in shape, but its chief attraction is in the finish—a dull moss green—making the effect very artistic and decorative. The heating element is the spool type so popular with a number of manufacturers.



Telephone City Electrical Club

The Telephone City Electrical Club have elected the following officers for the year 1919-20: President, Mr. A. C. McLean; vice-president, Mr. H. E. White; secretary-treasurer, Mr. Fred Perry.

The New Farm Help

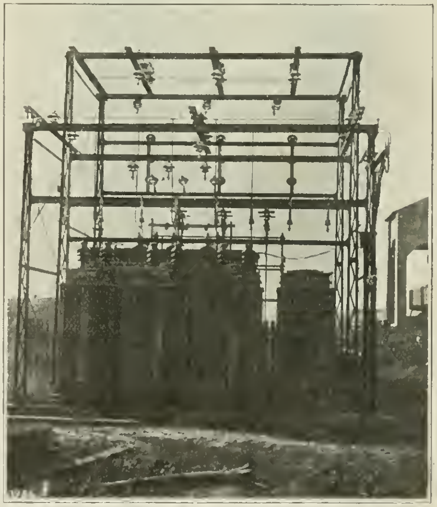
The Westinghouse Electric Manufacturing Company have issued a very attractive bulletin entitled "The New Farm Help" which explains how electricity does the work, saves expense, provides safe illumination and reduces the labor of the women folks on the farm. Well illustrated.

GIVE SOMETHING ELECTRICAL THIS CHRISTMAS
Her Electrical Christmas

Poster distributed by Society of Electrical Development

Outdoor Substation Public Policy[*]

The day of constructing outdoor substations simply to meet load conditions, regardless of appearance and adaptability to changing conditions, soon will be a thing of the past. People object to unsightly structures in their neighborhood and a substation built without regard to appearance is an obstacle in gaining good will for the utility. Wood pole structures are much inferior in appearance as compared to steel, often cost more and have greater depreciation. Central station public policy of to-day demands that an outdoor substation must present a pleasing appearance.



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[*] By H. W. Young, President Delta-Star Electric Co.

There are two angles to this: The public utility which can show properties and equipment that have a good engineering appearance can more easily attract financial backing. The public utility which makes it's outdoor substation construction neat in appearance arouses community pride and good will. Foresight is one of the chief factors for success in any line of work and foresight in selecting substation designs will produce good revenue and good will—both of which utilities need.

Personals

Mr. W. G. H. Carn has been appointed electrical and power engineer for the Canada Cement Co., Montreal. He was formerly engaged in the design and construction of lighting and power systems in the vicinity of Montreal.

Mr. W. F. McKnight, wire and cable sales engineer of the Northern Electric Co., Toronto, has been transferred to the Head Office at 121 Shearer St., Montreal, to undertake new duties as Educational Director for the Company.

Mr. C. H. Tillet has been appointed signal engineer of the Grand Trunk System in succession to Mr. R. F. Morkill, resigned. Mr. Tillet joined the signal department of the Grand Trunk in 1913, and was appointed supervisor of signals on the eastern lines of the system in that year. He was made electrical engineer of the signal department in June 1918, and acting signal engineer in December 1918, a position which he has held until his present appointment.

Mr. W. P. O'Brien has been appointed manager of the reorganized and enlarged New Business department of Montreal Light, Heat & Power Consolidated, with which department Mr. W. B. Johnston—who goes to New York City to handle the sales end of the Branston Violet Rays—was formerly identified. The scope of the department now under Mr. O'Brien's direction comprises power sales, electric and gas service sales, industrial gas appliances and services, branch offices and stores. Mr. O'Brien has been with the Montreal Light, Heat & Power Company for nearly twenty years. For the last eleven years he has been connected with the Power Sales end of the company's business, and for the last two years has been Manager of the Power Sales department.

Mr. W. P. O'Brien

Current News and Notes

Bowmanville, Ont.

The ratepayers of Bowmanville, Ont., will vote on the Hydro Radial by-law on November 22.

Chatham, Ont.

The Chatham Hydro-electric Commission have commenced taking over the service lines formerly supplied by the electrical department of the Chatham Gas Company which was recently purchased by the city. It is expected that the city will be entirely supplied with Hydro power by January 1.

Didsbury, Alta.

A by-law will be submitted to the ratepayers of Didsbury, Alta., on a proposal to dispose of the present light and power plant and purchase power from the Olds Electric Company, Olds, Alta.

Elk Lake, Ont.

A proposal is on foot to develop power at Indian Chute on the Montreal River, about 12 miles above Elk Lake, Ont., where it is said five thousand horsepower is available. This power would be used principally in the Matachewan gold mining area, about fifteen miles north, and also in the Gowganda silver mining region within a radius of 10 to 25 miles west.

Hamilton, Ont.

Hamilton, Ont., is one of seventeen municipalities that will shortly be called on to guarantee bonds for a hydro radial that is proposed from Hamilton to Elmira, Ont.

Montreal, Que.

X. Limitee have been granted letters patent and will take over the business of Volt Electric Registered. The head office is in Montreal and capital stock $49,000.

The International Electric Company, Limited, Montreal, have registered.

Adanac Storage Batteries, Limited, Montreal, have been granted a charter.

Oshawa, Ont.

The Hydro-Radial by-law will come before the ratepayers of Oshawa, Ont., on November 22.

Toronto, Ont.

A permit has been granted to the Canadian Allis Chalmers Company to erect a pipe-galvanizing plant at their foundy in Toronto.

Bates and McPherson have succeeded to the business of the Ross Electric Company, Toronto, contractor-dealers.

It is reported that the Hydro-electric Power Commission have purchased a portion of the Glebe property on Danforth Avenue, Toronto, for the purpose of erecting a power station in connection with the proposed eastern radials.

The Ontario Railway and Municipal Board have ordered the Toronto Railway Company to commence construction of a carline on Pape Avenue, to be completed not later than July 15, 1920.

Whitby, Ont.

The Hydro radial by-law will be voted on by the ratepayers of Whitby, Ont., on November 17.

Windsor, Ont.

The ratepayers of the nine border municipalities will vote on December 6, on the question of purchasing the Sandwich, Windsor & Amherstburg Street Railway, a subsidiary of the Detroit United Railways, at a cost of $2,100,000.

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Generation, Transmission and Application of Electricity

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Electric Welding An Important Commercial Asset

When the United States finally decided to enter the war there were in her different ports about 290,000 gross tons of interned German ships. These ships, it will be remembered, had been badly damaged by the Germans before being surrendered and, in several cases, the work of destruction was deemed to be so complete that the parts were labelled by the inspectors—"cannot be repaired." In any case it was estimated that at least a year and a half would be required to make such repairs as would be possible or advisable.

The war was raging, however, and the need of ships was urgent. An arc welding firm was given the opportunity of inspecting the wrecked parts and was consulted as to the advisability of using the electric arc to effect the repairs. It was quickly decided that the repairs could be made by this means and several gangs of men were set to work to cut and fit mechanical patches and weld them into place. In five and one-half months all of these ships were again sailing the seas at top speed, with full cargoes, carrying soldiers and ammunition to France.

The above statement of an outstanding victory of the arc welding machine over all other possible methods of repair furnished the climax to a most interesting paper on "Electrical Welding," presented before the Toronto section of the American Institute of Electrical Engineers on Friday evening, November 21. The paper was presented by one of the local members, Mr. F. K. D'Alton, of the Hydro-electric Power Commission Laboratories, and was illustrated by slides. In his treatment of the subject, Mr. D'Alton spoke first of the different non-electrical methods of welding. This was followed by a detailed account of the spot-welding machine, in which attention was drawn to the speed with which work can be done and, by illustrations, to the latest improvements in design. Finally the speaker outlined the whole operation of electric arc welding. He pointed out as matters of special importance the various points wherein the operator must be skilled, and the common troubles, with their causes. The theory of all the latest designs in arc welding equipment was covered, noting their limitations and drawing comparisons between welding by the arc and oxy-acetylene gases.

An interesting and quite unusual feature of the evening was the cartoon which Mr. D'Alton flashed on the screen at the conclusion of his lecture. This represented the Prince of Wales, who has just concluded such an auspicious visit to Canada and the United States, using his arc-welding equipment to bind together more closely these two nations, and illustrates John Bull as making a bid for the quick return of the Prince so that he may try out his welding machinery on Ireland.

Our present issue contains the first half of Mr. D'Alton's paper, which we consider one of the most complete and up-to-date treatises that has been published on the subject.

Montreal Planning An Electric Show

The question of an electrical show for Montreal was briefly discussed at the Montreal Electrical luncheon on November 12. Mr. P. T. Davies, the chairman, pointed out that it had been suggested that the next convention of the Canadian Electrical Association should be held in Montreal, and that an electrical show could be organized in connection with it. There had not been an electrical show in Montreal for many years, and the question of holding one was worth consideration.

A pessimistic picture of labor conditions in Australia was given by Mr. H. S. Bare at the luncheon on November 19. Mr. Bare spent five months in Australia, where he visited on business matters. The outstanding difficulty there, he said, was labor trouble—there was a clean-cut antagonism between capital and labor. One consequence was that opportunities for manufacturing were poor, and Australia imported enormous quantities of goods from the United States, and Canada, Great Britain having fallen behind owing to the war. Manufacturing was not carried on to anything like the exent as in Canada; "go slow" was the policy of the working classes in Australia, and naturally this affected production. "Australia for the Australians" was a favorite motto, and this view tinged the attitude of the people. There were good openings for Canadian trade in Australia, and if a preferential tariff was adopted it should result in a very large number of orders coming here. As it was, Canada was doing a fair amount of business with Australia, and he had noticed on the streets the products of the Eugene Phillips Electrical Works, Ltd., of Montreal. The climate was extremely warm, with the result that there was little heating of the houses, except by electrical heaters, which were freely used. There was a good market for cheap, reliable electrical heaters, which could be easily packed for transportation.

Speaking of business methods, Mr. Bare stated that trade must be done through the jobbing houses. Business men were keen to get prices in order to compare them, but generally it was necessary to convince business men that you had something better and cheaper before they would make a change. There was keen local competition in the selling of machinery. It was useless for a traveller to try to sell from catalogues, the buyers wanted to see samples. The methods of the big jobbing houses were entirely different to those in Canada; for example, there were no selling organizations such as we were familiar with, the business firms waiting for trade to come to them rather than seeking for it.

Mr. Bare spoke in praise of some features of Australian life, emphasizing the splendid civic improvements in Sydney. The railway tracks were solidly built, the stations imposing and very substantial so far as the exteriors were concerned, but devoid of the comforts and conveniences of Canadian depots, in the interiors.

Water Power in Alberta

The Commission of Conservation is reprinting, for distribution, a most interesting paper on the subject, "Power in Alberta," which was presented before the recent Calgary Industrial Council, by Mr. James White, assistant to chairman, Commission of Conservation The article deals with power under the triple heading—water, coal and natural gas.

Alberta has a very fair share of water power, but, unfortunately, the more powerful falls are some considerable distance from the present industrial centres. The following table indicates the head, estimated minimum horsepower, and approximate location of all the falls of 5,000 h.p. and up.

WATER POWERS IN ALBERTA HAVING AN ESTIMATED MINIMUM CAPACITY OF 5,000 H.P. OR OVER

Site	Head, feet	Estimated minimum h.p.	Distance from principal market and cognate data*
Bow River:†			
Radnor	44	8,000	25 miles from Calgary.
Ghost	50	9,000	30 miles from Calgary.
Mission	47	8,000	35 miles from Calgary.
Bow Fort	66	11,000	38 miles from Calgary.
Horseshoe fall	70	12,000	42 miles from Calgary.‡
Kananaskis fall	70	12,000	45 miles from Calgary.‡
Elbow river:			
Near Cañon creek	225	5,000	30 miles from Calgary. Other scheme using head of 500 feet also possible.
North Saskatchewan river:†			
Rocky rapid	85	28,000	65 miles from Edmonton. Would require a dam 85 feet high.
Athabaska river:			
5 m. above Mountain rapid	15	7,000	220 miles from Edmonton.
Rock rapid	12	5,000	220 miles from Edmonton.
Crooked rapid	13	6,000	220 miles from Edmonton.
Long rapid	28	12,000	220 miles from Edmonton.
Middle rapid	20	9,000	215 miles from Edmonton.
Boiler rapid	25	11,000	215 miles from Edmonton.
Grand rapid	54	22,000	200 miles from Edmonton.
Pelican rapid and rapid above	17	7,000	165 miles from Edmonton.
Baptiste power	80	12,000	150 miles from Edmonton.
7 miles above Baptiste river	42	6,000	150 miles from Edmonton.
Peace river:			
Vermilion fall and rapid	26	20,000	340 miles from Edmonton.
Peace Cañon rapids**	225	94,000	380 miles from Edmonton. Would require a flume or conduit about 9 miles long, if developed at one site.
Slave river.			
Lower Fort Smith Rapids power	48	128,000	450 miles from Edmonton.
Upper Fort Smith Rapids power	69	184,000	445 miles from Edmonton.

* The mileages given in this column are air-line distances and, in most cases, are only given to the nearest five miles. As a rule, the transmission line would be at least 10 per cent longer.

† The figures for the North Saskatchewan and Bow rivers are for regulated flow. For the Bow, the minimum, with unregulated flow, is less than one-half the figures given.

‡ Calgary Power Co.'s hydro-electric plant.

** In British Columbia.

The total low power potentiality of the water powers of Alberta is estimated at 450,000 h.p. and developed water power aggregates 33,000 h.p. The report points out that this table does not indicate any great resources in the well-settled portions of the province, and that it is necessary to consider measures to supplement or to replace power from water. Unfortunately, too, there is little natural provision for water power storage. The streams of Alberta do not drain large lakes nor is it possible, in general, to construct large artificial reservoirs, except at heavy cost. In Alberta, numerous coal resources, however, Mr. White says, supplement for the deficient power during the low water months. Auxiliary steam plants could be installed to take care of the peak loads.

The author makes a general comparison between the relative cost of installation and operation of steam power and water power plants, and quotes authorities to show the error of the generally popular belief that water power is inherently cheaper than steam power. As a matter of fact, their relative costs are dependent upon a number of considerations, and in many instances, steam power is cheaper than water power.

The quantity of coal in Alberta is, of course, almost unlimited. This province contains 87 per cent. of the coal of the Dominion, practically the whole settled portion of the province being underlaid by this valuable fuel. The paper points out the possibilities in the establishment of large centralized plants and states that "one giant unit of 80,000 h.p., such as is now operating in a street railway power house in New York, could supply nearly the whole of the present power consumption of the principal industries of the province of Alberta."

This idea of centralization of generating plants becomes all the more attractive in view of the actual developments in long distance transmission. In the province of Ontario, transmission at 110,000 volts has reached a radius of approximately 300 miles, and in the United States, with still higher voltages, still wider areas are being supplied. There are apparently great possibilities for distribution of power in Alberta, when her water powers have been supplemented by her coal resources.

Electric Light Increases Egg Production

A very interesting report of experiments made in the Poultry Plant of the Manitoba Agricultural College, Winnipeg, using electric light as a factor in increasing winter egg production, has just reached us. The figures are surprising and indicate that, for a comparatively small additional expense, production can be increased out of all proportion.

The experiments were performed with 12 pens of 25 single comb White Leghorn pullets, uniform in age, size and condition. Six of these pens were given artificial light and six pens no artificial light between the dates November 15, 1918, and April 15, 1919. Where the extra illumination was used, lights were turned on at dusk in the evening and the pens were kept lighted until 10.30. In the morning the lights were again turned on at 7 o'clock until daylight. The pullets in the lighted pens were not given their evening feed until between 7 and 8 o'clock.

The following figures show what effect the lighting had and how soon after starting the experiments effects were noticeable. The figures date from the week beginning October 27, although, as already stated, the extra light was not commenced until November 15.

It is noticeable that a very marked increase in production is shown the very first week the extra lights were used, that is the week beginning November 17. It is seen that this advantage was held consistently throughout, until the week beginning March 9. From then on the advantage rested slightly with the non-lighted groups.

Summing up the total production it will be seen that the 6 groups in the artificially lighted pens produced 13,544 eggs throughout the total period of the records, as against 11,661 for the non-lighted groups, a difference of approximately 157 dozen, or more than a dozen per fowl. This is

Week ending		150 Pullets under Artificial Lighting Conditions	150 Pullets under Ordinary Daylight Conditions
October	27	220 eggs	224 eggs
November	3	224 “	198 “
“	10	210 “	202 “
“	17	373 “	249 “
“	24	497 “	233 “
December	1	553 “	269 “
“	8	569 “	273 “
“	15	571 “	344 “
“	22	496 “	318 “
“	29	245 “	142 “
January	5	133 “	59 “
“	12	397 “	200 “
“	19	558 “	361 “
“	26	519 “	300 “
February	2	441 “	213 “
“	9	287 “	161 “
“	16	257 “	186 “
“	23	277 “	175 “
March	2	204 “	166 “
“	9	**273** “	312 ”
“	16	436 “	501 “
“	23	387 “	434 “
“	30	419 “	516 “
April	6	480 “	574 “
“	13	490 “	544 “
“	20	443 “	500 “
“	27	434 “	511 “
May	4	468 “	581 “
“	11	466 “	578 “
“	18	500 “	595 “
“	25	462 “	473 “
June	1	270 “	277 “
“	8	299 “	310 “
“	15	412 “	363 “
“	22	274 “	319 “

not the most important point to consider, however. The months of November, December, January and February are the months of abnormally high prices and totalling the production in the two cases, beginning November 10 and ending March 9, it will be seen that the production of the artificially lighted groups was 6,587, as against 3,851, a difference of 228 dozens. Fresh eggs in a number of Canadian cities are today quoted at $1.00 per dozen and in Toronto have already reached $1.30; this, at a time of the year when the highest price has not generally been reached. Under such conditions the added production of 228 dozens from 150 fowls shows a very marked advantage in favor of extra lighting.

It will be seen further that for the week beginning March 9th the "No Light Pens" for the first time laid more eggs than the "Lighted Pens." This is accounted for by the fact that the days were then getting longer and the electric light was of no more use. The shorter the days, the greater the value of the light. Even better results than these could be obtained were the lights turned on earlier in the fall. As early as October 1st would be all right for Western conditions in the opinion of the Department. The effect of a drop in temperature is also clearly seen in the detailed record above. The weeks beginning December 29th and January 5th show what will occur during a cold snap. For three weeks in February and two weeks in March the same thing happened.

The summary which follows will show, further, the cost of the feed for both "Lighted" and "No Light Pens," and also the number of eggs produced by both lots from November 15th to March 1st. The cost of producing a dozen eggs, and also the number of ounces of grain required to produce a dozen eggs is shown.

Lighted Pens. Feed Account.

Grain, 1778 lbs. at 3c per lb.	$ 53.34
Oats, 1663 lbs. at 2½c per lb.	41.58
Milk, 1440 lbs. at 25c per cwt.	3.60
Bone, 36 lbs. at 5c per lb.	1.80
Shell, 152 lbs. at 1½c per lb.	2.28
Grit, 47 lbs. at 1½c per lb.	.71
Mash, 120 lbs. at 2½c per lb.	3.00
Cabbage, 500 lbs. at 1c per lb.	5.00
Total cost of feed	$111.31
Light cost	$11.50
Eggs laid	6,324
Cost per dozen (including light)	21.1

It took 9 oz. grain to produce one egg.

No Light Pens. Feed Account.

Grain, 1700 lbs. at 3c per lb.	$ 51.00
Oats, 1564 lbs. at 2½c per lb.	39.10
Milk, 1075 lbs. at 25c per cwt.	2.69
Bone, 36 lbs. at 5c per lb.	1.80
Shell, 131 lbs. at 1½c per lb.	1.97
Grit, 70 lbs. at 1½c per lb.	1.05
Mash, 120 lhs. at 2½c. per lb.	3.00
Cabbage, 500 lbs. at 1c per lb.	5.00
Total cost of feed	$105.61
Eggs laid	2,557
Cost per dozen	33.6

It took 14 oz. grain to produce one egg.

We are indebted for the information given in this article to Mr. M. C. Herner, Professor of Poultry Husbandry, Manitoba Agricultural College, Winnipeg, Man.

N.E.L.A. Courses Open to All

In accordance with its customary liberal policy the National Electric Light Association has opened for subscription all of its educational courses at the association prices to whosoever wishes to subscribe. Up to the present time subscriptions to these courses have been confined to its members, but due to the continued demand from allied industries, colleges, and schools for use of these courses, the Public Policy Committee and the Executive Committee at its meeting on October 2nd approved a resolution opening subscriptions to all who may apply, believing that a wider distribution of these courses would be of general benefit to the industry as a whole. The N. E. L. A. courses are four in number; the course in Practical Electricity, and Commercial Engineering course, both published by the Commercial Section; the Elementary Accounting course, and the Advanced Accounting Course, published by the Accounting Section. These courses have been very popular within the Association, and undoubtedly will prove their popularity in value to the industry in general.

A NATION WELDER
SAY UNCLE! WHEN YOU GET THROUGH WITH THAT WELDING JOB SEND THE BOY BACK 'OME WE HAVE A BIG JOB WITH IRELAND
CANADA
U.S.A.
METTLE ELECTRODE
BRIT
JOHN BULL

The Prince of Wales has been so successful on this continent that John Bull wants him to try his apparatus on Ireland—Cartoon shown at Mr. D'Alton's lecture on Electric Welding.

Some Interesting Data on Cost and Operation of Transmission Lines

Owing to the great advance in cost of labor and material, the cost of transmission lines have greatly increased over those of pre-war conditions. The present approximate cost for some transmission lines in Ontario may representatively be cited as follows:

A main line 'heavy duty' steel tower transmission line, carrying two lines at 110,000 volts, such as the latest type of line used by the Hydro-Electric Power Commission of Ontario between Niagara Falls and Toronto, with 66-feet right-of-way, the equivalent of 4-0 copper conductors, telephone service, and all items of expense, would be about $17,000 per mile.

A 110,000-volt line, single circuit, supported by wood poles, with 66 feet right-of-way, and the equivalent of 1-0 copper conductors, and telephone line, would be about $8,500 per mile. If pole rights alone are secured the cost might be reduced to about $5,500 per mile.

A 44,000-volt, wood-pole line, with steel conductor and telephone line on same poles, could be erected for about $3,000 per mile, but, if there were considerable rock excavation for poles, this cost might easily be doubled.

A 22,000-volt line, carrying one circuit of approximately the equivalent of No. 1 copper conductor and with telephone line, would cost about $3,500 per mile.

Smaller lines of about 4,000 volts, with equivalent of No. 4 copper conductors, have, under present conditions, been built for about $2,000 per mile.

At the present time, a transmission line from Winnipeg to Portage la Prairie is under construction. It will be 60 miles long, of steel tower construction and will have an ultimate capacity of 20,000 kw. The immediate installation is of one circuit line of No. 0 aluminium cable which is estimated to carry 5,000 kw., at 66,000 volts with a 3 per cent. drop in voltage at Portage la Prairie; or 10,000 kw. with 15 per cent. voltage loss. The second circuit will be installed as soon as the demand for power warrants it. The estimated cost is $4,600 per mile, which includes sub-stations at Winnipeg and Portage la Prairie. As it follows the highway no right-of-way was purchased except at a few points where the line is on private property.

COST DATA OF TRANSMISSION LINES

Line	Year built	Length, miles	Voltage	Cost per mile	Remarks
				$	
Canadian Light and Power Company, Montreal.	1911	27	44,000	11,000	2 circuits of 2-0 copper, steel towers.
Laurentian Power Company, Quebec.	1916	24	50,000	6,875	2 circuits of 1-0 copper, steel towers.
Shawinigan Water & Power Company.	1902-10	550	50,000	1,500	Single circuit, aluminium, wooden poles.
				3,500	2 circuits, aluminium, steel towers.
" " ..	1910	94	100,000	7,500	2 circuits, aluminium, steel towers.
Sherbrooke Municipal	1917	30	45,000	2,334	Single circuit, No. 4 copper, wooden poles.
Hydro-Electric Power Commission. Niagara system.	1907-13	325	110,000	14,000	2 circuits 4-0 and 3-0 copper and equivalent aluminium, steel towers.
" " ..	1907-13	765	26,400 and under.	2,200	Single circuit, aluminium and copper, wooden poles.
				3,000	2 circuits, aluminium and copper, wooden poles.
Muskoka system...	1915	26	22,000	2,025	Single circuit, No. 2 aluminium, wooden poles.
St. Lawrence system.	1913-15	60	26,400	2,458	Single circuit of 3-0 aluminium, wooden poles.
Kamloops Municipal.	1916	42	44,000	1,667	Single circuit of No. 2, aluminium, wooden poles.
West Kootenay Power and Light Company, Rossland.	1897-1905	170	60,000	4,000	Single circuit, 92,000 c.m. copper, wooden poles.
" " ..	....	32	20,000	2,000	2 circuits, No. 2 copper, wooden poles.

LINE LOSSES

Name of company	Termini	Voltage at generating end	Distance	Loss per cent
			Miles	
Shawinigan Co.......	Grand'mère to Montreal...	100,000	94	10
Can Light & Power Co.	St. Timothée to Montreal..	44,000	27	8
Laurentian Power Co.	St. Féréol to Montmorency	50,000	24	5
Sherbrooke Municipal	Weedon to Sherbrooke.....	45,000	30	13
Hydro-Electric Power Com.	Napanee to Kingston.. ...	44,000	30	10
Toronto Power Co....	Niagara Falls to Toronto..	60,000	80	20
Dom. Power & Traction Co.	Power Glen to Hamilton..	44,000	33	6
Winnipeg Municipal..	Pte. du Bois to Winnipeg..	66,000	78	20
Calgary Power Co....	Kananaskis to Calgary....	50,000	50	7½
West Kootenay Power and Light Co.	Bonnington to Greenwood.	60,000	82	10
B. C. Electric Ry. Co.	Jordan plant to Victoria..	60,000	43	16

Extensive Work in Saguenay District

Extensive improvements in connection with the pulp and paper industries are being carried out in the Saguenay district. P. Q. Fraser, Brace & Co. are engaged in constructing a dam and other works for the development of a power mill at Saguenay, for Price Bros. The Chicoutimi Pulp Company are adding to their power development, at Chicoutimi, not only for power purposes for the ground wood mill, but for extra lighting for the town. J. G. White & Co., New York, are building extensive wharves at Ha-Ha Bay, which will probably be electrified. At Kenogimi, Price Bros. have erected a theatre and club house for the men at a cost of $50,000.

The Diamond State Fibre Co. of Canada

The Diamond State Fibre Company of Canada, Limited, have opened up an office and factory at 455 King Street West, Toronto, for the manufacture of the Diamond State Fibre Company's well known insulating fibres. These include the Diamond insulating fibre, the Disfico Insulating fibre and the genuine horn fibre, the latter product being exclusively manufactured by this company. We are advised that the Canadian company will manufacture these lines in Canada beginning December 1, and carry a complete stock of sheets, rods, tubes, bushings, washers, etc. This is the first factory of its kind in the Dominion. The Canadian business will be in charge of Mr. T. E. Webster, as general manager.

The Quebec City Council have given final reading to a by-law empowering the Quebec Railway, Light, Heat & Power Co. to increase the street railway fares to seven cents—four tickets for 25c, 17 tickets for $1; 3c. cash fare for children not in arms, or 8 tickets for 25c.; eight tickets for 25 cents to school children up to 16 years; six tickets for 25 cents for employees, good between the hours of 6 and 8 a.m. and 5 and 7 p.m. Under the proposed contract, the company will have to construct certain new lines and extensions.

Electric Spot and Fusion Welding

A Detailed Resume of the Progress and the Present Status of This Valuable Commercial Art—Illustrations of Various Types of Joints

By F. Keith D'Alton*

The processes of electrical welding are matters of growing interest to mechanical and electrical engineers. The neatness and strength of the welded part, together with the speed, cost and certainty of the operation are points which specially appeal to the mechanical engineer. The electrical engineer appreciates the fact that there is a field opened up for special equipment which he may design and standardize, and for which there is a gradually increasing demand.

Welding may be defined as a process in which metals are fused together when melted under the influence of intense heat, with, possibly, the application of pressure as well. Classification may be made as follows:

Autogenous Welding—includes the processes where the metals to be welded are raised to so high a temperature that they flow together to form a weld without pressure being used.

Forge Welding—the forerunner of the modern welding processes. The metals are raised sufficiently high in temperature that they may be joined by applying a pressure and hammering on the anvil. The heat may be obtained by any one of several suitable methods.

Oxy-Acetylene Welding—covers that branch of autogenous welding wherein the heat is produced by the chemical combination of oxygen and acetylene gases.

Thermit Welding—another branch of autogenous welding, not greatly used, wherein the heat is produced by another very rapid chemical combination.

Electrical Welding—is a divided branch and comes under the classification of both autogeneous and forge welding.

Theoretically it is possible to weld metals, but practically this is not so. Simply causing metal to melt and to run into a joint or part to be filled, does not necessarily produce a good weld. Brass and bronze with a low (3%) percentage of zinc can be successfully welded if care be taken, but brass with a higher percentage of zinc is apt to be porous. It is difficult to weld aluminium, since this element oxidizes at a lower temperature than its melting point, and the weld will most surely contain a considerable percentage of the oxide of the metal. These metals may be classified as being those of low melting point compared with the grades of iron and steel commonly used. The metals best suited for welding are—boiler plate, wrought iron, grades of steel for fabricated shapes in general commercial work.

Since by far the greater amount of welding is done on iron and steel in the three forms mentioned above, and as the behavior of the different elements existing in these grades depends very much on conditions which are subject to variation, but under the control of the operator, we shall confine our further remarks to these metals which we most frequently meet.

Chemical Elements in Iron and Steel

In the various forms of iron and steel we find a number of well known chemical elements, each of which makes its presence felt by giving some characteristic to the metal:

Cast iron may be in the form of gray or white iron, depending upon whether the metal is cast in sand or in cold metal moulds. Due to its brittleness and low tensile strength, it is difficult to weld cast iron by any process; even under most favorable conditions the results are always uncertain. Malleable castings are simply annealed white iron castings. The annealing frees part of the carbon, but as this effect is largely at the surface, it does not improve the condition of the metal for welding.

Wrought iron is metal which has been given mechanical treatment while cooling. This mechanical treatment squeezes out the slag, gives the metal a finer grain and increases its toughness. The quality of wrought iron is a function of its purity.

Steel produced by the Bessemer or Open Hearth process may contain, in different proportions, any or all of the following elements—carbon, manganese, nickel, chromium, vanadium, and tungsten. The physical characteristics are determined by the percentage and kind of impurities present.

Carbon is present in varying proportions in all grades of iron and steel. The proportion of free carbon is comparatively large in grey cast iron. In white iron the proportion of carbon is approximately the same as in gray iron, but it is in the combined state. The annealing to produce malleable castings has the effect of freeing the carbon, producing purer iron. In steel the carbon content determines the tensile strength.

Phosphorous is undesirable and causes brittleness when the metal is cold. Sulphur is equally undesirable as it causes brittleness when the metal is red hot, or hotter. Silicon causes brittleness, but gives the metal the power to resist abrasion; one half of one per cent. silicon is a maximum. Manganese may be present up to one-fifth of one per cent; increase in manganese increases the ductility and toughness and prevents the iron from combining with phosphorus and sulphur. Further increase up to 5.5% causes brittleness, but additional increase up to 10% makes the steel ductile again but hard.

Nickel increases the tensile strength without lessening the elasticity, and gives the steel a certain resistance to combining with atmospheric oxygen; nickel steel, therefore, does not rust easily. Vanadium, in effect, is similar to nickel. Chromium produces results similar to manganese. Tungsten causes the steel to retain its hardness at high temperature.

Having now considered some of the principal features of iron and steel which must be taken into account in welding, we will consider the practical processes themselves. It will be necessary to re-classify these various methods according to the source of heat. The most common processes naturally fall into two classes—gas welding and electrical welding.

Gas Welding

In this process the heat is obtained by the combustion of acetylene gas with oxygen. These gases are mixed in a suitably designed torch which is light in weight and held in one hand by the operator. The other hand controls the feeding-in of the filler material. The oxygen gas is supplied in tanks at a pressure of 1,800 pounds per square inch, while the acetylene is supplied in solution in acetone under a pressure of 250 pounds per square inch, and contained in tanks of somewhat lighter design than those used for oxygen.

Some manufacturers advocate the low pressure system using gas in the torch, at a pressure of about 13 ounces per square inch, while others recommend the high pressure system in which the pressure is about 15 pounds per square inch. Each of these methods has its advantage over the other. It is claimed that the low pressure system makes more efficient use of the gases in the tanks, being able to use a larger percentage of the total gases purchased. It also permits the use of a portable gas generator for producing acetylene. The high pressure system requires such high pressure at the tanks that they must be returned to the supply station to be refilled there.

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*Before Toronto Branch A.I.E.E. Nov. 21.

Acetylene under a pressure of two atmospheres is considered to be highly explosive on account of the compound being easily disintegrated and liable to be impure, due to the presence of oxygen in the acetylene tank.

The high pressure system requires a reducing value which frequently results in fluctuations in the pressure of the gases. Excess of oxygen, which is usually a condition of the low pressure flame, results in burning the metal, whereas an excess of acetylene results in adding carbon to the metal. It is quite possible, therefore, that due to the oscillating motion which the operator gives to the torch in making a weld, one side of the added material may be burned while the other side is carbonized. The metal added would then not be uniform and the result might be a poor weld. The flame must be neutral and as steady as possible. The high pressure system will work much more rapidly than the low pressure system, cutting at a faster rate with a narrower cleaner cut.

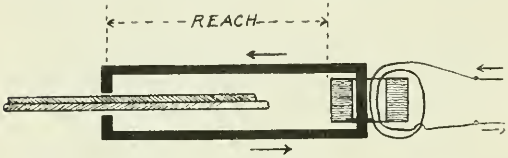

Fig. 1—Single Spot Welder—Large reactance in loop.

Both systems of gas welding produce narrow and very hot flames (6300°F) which are especially adapted to the cutting of metal. In welding, however, a filler must be added and the composition of the material in the filler, to a large degree, determines the effectiveness of the weld.

The process of gas welding, the chief competitor of electrical welding, having been described in principle, let us now study in more detail the processes in which the heat for welding is produced electrically. There are two distinct branches, namely, "Spot Welding" and "Fusion Welding."

Spot Welding

This is a process dependent upon both heat and pressure, wherein the heat is produced by an electric current passing through the contact resistance between two pieces of metal and the electrodes.

The electrodes are usually of copper which close on the sheets to be welded and through the electrodes the pressure is applied. This process can be used for all metals. It produces a weld which is much stronger than riveting and nearly as strong as the metal itself. Moreover, one spot weld makes a rigid joint, whereas one rivet allows the parts to rotate about it. The electrical spot welder is largely limited to small-size jobs on account of the "reach" of the equipment. By the term "reach" is meant the distance which the upper electrode will extend over the plates being welded. This determines the size of job which can be done on a particular spot welding machine.

This process is much faster than rivetting and the results are more lasting. It does not require an experienced operator as the welding simply consists in placing the plates in position in contact with the lower electrode, then bringing the upper electrode down on top of them and turning on the electric current. The movement of the upper electrode is controlled by a lever, a little additional pull downwards on this turning on the current. The current is adjusted at the beginning of the operation and is given a value suitable for the particular work which is to be done. Compared with ordinary forge welding, the action is much more speedy and the metallic oxides, so troublesome to a blacksmith, are eliminated.

The spot welding machine has not been overlooked in the progress of recent years; various radical changes and improvements have been made. While either alternating or direct current may be used, the ease and efficiency with which alternating current may be transformed into currents of high amperage render it most suitabe.

In the single-spot welder the power is supplied through a contactor to a transformer contained in the machine. The secondary circuit of this transformer consists of only one turn which includes in the loop the electrodes and metal being welded. On account of the extent of the "reach" the secondary circuit becomes a reactance loop of greater or less length, see Fig. 1. Due to the large currents in this loop the reactance becomes an objectionable feature and, in order to overcome this difficulty, the duplex-spot welder was brought out.

In the duplex-type of welder, Fig. 2, the secondary reactance loop is reduced to a minimum and is independent of the reach of the machine. Two complete identical equipments are placed, one above and one below, the plates being welded. Each equipment has two parallel electrodes and contains one half of the secondary loop. The upper electrodes are brought down on to the work in such a position that they are directly opposite the electrodes of the lower equipment. The secondary currents then circulate downwards through the plates on one side and up on the other side, thus giving higher efficiency by avoiding a long loop with its additional resistance and reactance. Also, while the equipments are identical, currents of any appreciable value will not pass horizontally in the plates.

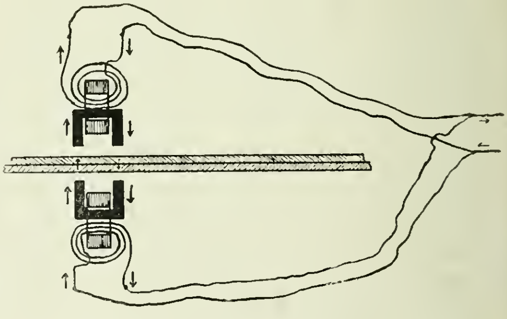

Fig. 2—Duplex Spot Welder—Minimum reactance in loop

Line welding is a branch of spot welding producing a joint similar to a line of rivets, but stronger and water tight.

Electric Fusion Welding

Both welding and cutting by means of the electric arc will be considered under this heading. In these processes, the electric arc is used merely for the production of a high temperature ranging from 6300°F. to 7300°F.

Arc welding is specially suited to such work as (a) joining of plates or broken parts; (b) building up parts worn by use; (c) filling blowholes in defective parts; (d) caulking joints.

Before proceeding to make a repair or to build up worn parts by the electric arc welding process, the material must be prepared for the operation. All scale, grease and dirt must be removed from the part on which the welding is to be done in order to avoid impurities in the weld. For this, a file, chisel, wire brush or sand blast may be used. The material must then be shaped in such a way that the new metal being added will touch the original metal over a fairly large surface giving opportunity for good fusion to produce a strong weld.

For electric arc welding, both direct current and alternating current are used. As these differ widely in the nature of the equipment used, and more or less widely in the results obtained, it seems advisable to discuss each separately, taking first the one most commonly used, namely, direct current.

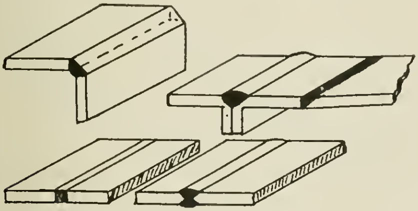

Fig. 3—Butt weld.

Having prepared the material in the part to be welded, the two leads from the direct current welding panel are brought along and the positive lead connected securely to the piece of metal on which the work is to be done; the "job" then becomes the positive electrode. The negative lead is connected to the "electrode holder," a device for gripping a piece of welding wire or stick of carbon, and sufficiently light in weight to be manipulated with one hand by the operator. The carbon electrode demands a much more massive holder than the metallic electrode on account of the greater heat generated with the carbon. This negative electrode, either carbon or metallic, will hereafter be referred to simply as the "electrode."

The polarity as just mentioned is a very important point. It is estimated that seventy-five per cent. of the heat developed by an arc is at the positive electrode, the remainder being generated at the negative electrode and in the vapor of the arc itself. The piece of metal being repaired has usually a much higher thermal capacity than the electrode, so that by properly connecting the leads we get the heat developed just where it is required, and in sufficient quantity to keep the temperature of the metal up to melting point in spite of the fact that heat is lost by conduction in the material. Also it reduces the rate of melting of the electrode material giving the welder better control of the operation. In a case where a carbon electrode is used, having the polarity right prevents unconsumed particles of carbon being carried into the weld and causing hardness. A reversed polarity gives an unstable arc and the added metal is a spongy deposit with a hard and scaly surface.

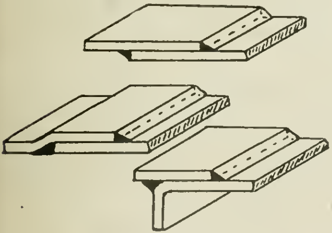

Fig. 4—Lap weld.

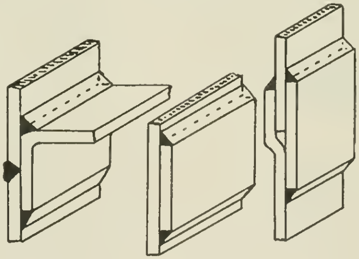

Fig. 5—Strap weld.

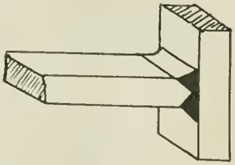

Fig. 6—Tee weld.

Having made certain that the polarity of our connections is correct, the arc is now struck by touching the electrode to the piece of material on which the operation is to be performed, and pulling away again a short distance, establishing the arc. If a carbon electrode be used a filler will be required and must be fed into the weld in just the same manner as with the oxy-acetylene process. When metallic electrodes are used the electrode itself acts as the filler. The operator moves the electrode over the work at a distance of about 3/16 inch. The fusing electrode (or filler) gradually fills up the space attaching itself to the parent metal and becoming a part of the original material. An extra supply of metal may be added and machined down to desired size when cooled. As soon as the metal in the weld begins to cool it should be hammered in order to reduce sponginess, to equalize the strain and to give the metal a finer grain.

Welding may be done at any angle, on the horizontal, vertical or overhead. While the British Admiralty avoid overhead welding unless absolutely necessary, a considerable amount of it is done in America. It is claimed to be merely a matter of training operators. The operation on overhead work is similar to normal welding except that there is some difficulty in holding the electrode steady in the cramped position usually required. With a steady arc length however, successful work can be done. The carbon electrode is not applicable for overhead welding.

Carbon Electrodes

Where welding or cutting is done with carbon electrodes the current used may range from 100 to 1000 amperes, and the voltage required will be from 40 to 50 volts. The diameter of the electrode is suited to the current used according to the following table. The length of the carbon does not usually exceed 12 inches:

Diameter of electrode	Maximum current
1/4 inch	100 amp.
1/2 "	300 "
3/4 "	1000 "

In cutting with the carbon arc it is advisable to use the heaviest current possible. By doing so the cutting speed is increased and labor cost reduced in consequence. The speed of cutting increases roughly in proportion to the current used. There are several grades of carbon used for electrodes:—(a) The plain hard carbon for ordinary use; (b) copper coated carbon with high conductivity; (c) graphite rods, soft, for use on high current density. The latter two grades are more or less special and may be used by certain operators who prefer them.

In welding with these electrodes, the filler does not traverse the arc but is fed in by the operator, melted by the arc and deposited in the weld. Scrap material should not be used for filler as it introduces impurities into the weld. The arc will be more steady if the end of the carbon be tapered. For this reason carbons supplied are usually tapered at the arc end but ordinary flat ended carbons may be procured.

There are some points in connection with the use of carbon electrodes for welding which tend to favor the use of the metallic electrode in their stead. These are:—(a) Liability of carbon being carried into the deposited material thereby reducing ductility and, (b) difficulty of obtaining good fusion due to the tendency of deposited metal to overlap on the original metal; (c) requiring more skill to manipulate than the metallic electrode; (d) very hot arc causing discomfort to the operator and resulting in lower efficiency; (e) greater cooling stresses are developed since larger areas of material are heated.

Metallic Electrodes

These electrodes consist of rods of fairly pure iron or mild steel about 1/16 to 3/16 inches in diameter, the choice of diameter being made in accordance with the thickness of the plate. The current used ranges from 75 to 180 amperes, with a voltage of 15 to 30 volts. The voltage used does not affect the composition of the weld.

The following table gives the currents and electrode diameters used in joining steel plates:

Thickness of Plate	Maximum Current	Diameter of Electrode
1/8	75	1/16-3/32
1/2	125	1/8
5/8	155	5/32
above 5/8	175	3/16

It is claimed that the metallic electrode gives greater speed in the deposition of metal than the carbon electrode. With the mild steel electrodes, containing various elements such as carbon, nickel, silicon, vanadium and chromium, one is inclined to think that these metals will all be found in the deposited metal, but oxidation is more or less complete with the result that these metals are almost completely oxidized away, leaving the sulphur and phosphorus, which are usually present, in the same proportions as in the original electrode. The deposited metal is a fairly pure cast steel with only traces of the elements contained in the electrode material. Too much oxidation of the original filling-in material will produce porous, spongy and generally unsatisfactory welds. The silicon and manganese, acting as powerful reducing agents tend to prevent excessive oxidation of the electrode material.

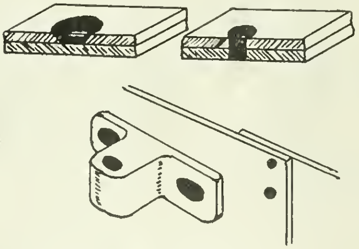

Fig. 7—Plug weld.

Some manufacturers produce a covered electrode making certain claims on its behalf. In cases where these are used, the covering melts with the electrode material and forms a protective slag on the surface of the deposited metal, thereby keeping away the oxygen of the atmosphere and preventing oxidation. The British Admiralty use the coated electrode for all welding work. It is American practice, however, to use the bare electrode with a fairly large percentage of manganese which tends also to prevent oxidation by reducing any oxide formed. The Emergency Fleet Corporation of the United States have clearly demonstrated that bare electrode welding produces just as satisfactory results as those obtained with flux covered electrodes, and they claim, therefore, that the use of the expensive flux covered electrode is not justified. In Canada, the bare metallic electrode is used most extensively, manufacturers and welders being inclined to think that the flux coating is an unnecessary adjunct.

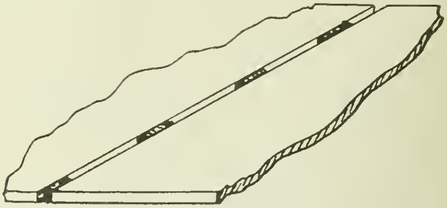

Fig 8—Tack weld.

The coatings used are of two classes—(a) those which form a liquid slag which finally solidifies on the surface of the weld and is machined off and (b) those which volatilize at the temperature of welding.

With the flux which volatilizes easily, the effect of its presence will be chiefly an oxidizing of the carbon which would otherwise be carried into the weld. This will disappear as carbon dioxide gas. The liquid slag formed from the other kind of coating tends to retain heat causing the welded part to cool more slowly thereby reducing strain. A coating of either kind permits the use of special alloys in the electrode and so leads to the manufacture of electrodes according to a definite formula for special work. There is, however, a liability of the slag itself contaminating the weld. If ordinary care be taken and the work kept clean, a good weld can be made without flux, as demonstrated by American welders.

Considering now the joints used in the welding of boiler plate, we find that several different kinds are necessary. In the simple butt joint, Fig. 3, the deposited metal is actually in tension while it is in shear in the commonly used lap, Fig. 4, and strap joints, Fig. 5.

The butt joint shows strength of 90%-95% of that of the unperforated plate, and the welded overlap joint 70% to 80%, while a triple riveted overlap joint showed only 65% to 70% of the strength of the original plate. Riveted joints have a tendency to slip past each other, shearing the rivets. Further, in riveting, good metal is removed to make way for softer metal, while in welding the good material is not removed and a continuous joint of harder and stronger material is built up. The welded joint, though stronger than a riveted joint while under continuous stresses, will only last about 60% as long as a riveted joint under alternating stresses. Hence for ship construction where stresses are liable to be large and frequently alternating, the welded joint must be carefully made and tested to be sure that it will not fail at a crucial moment.

Such joints as the "Tee" joint, Fig. 6, or the "Plug" joint, Fig. 7, combine in some measure the features of butt and lap joints, and are used where conditions require such a joint. The plug joint is very much the same as a spot weld on thick material. Fig. 8 illustrates a Tack weld.

(Concluded in Dec. 15 issue)

The Progress of Railroad Electrification

Particularly Adaptable On Heavy Grades, in Tunnels and in Large City Terminals—U.S. Steam Roads Now Using 25 Per Cent. of All Coal Mined

By Mr. Paul M. Lincoln*

In speaking to you on the subject of railroad electrification, I may say that my remarks will apply only to conditions in the United States. What I have in mind is the situation in general. My remarks will, therefore, not apply to any local conditions, but rather to the situation as a whole.

Just a word as to the history of railroad development. Organized transportation is one of the indexes of our state of civilization. It is one of the things that differentiates civilized man from the savage. And the railroad is the greatest factor in organized transportation, though it is less than 100 years old—the first commercial railroad having been started in Great Briatain in 1825. If you consider the proportions to which it has grown you will appreciate the rapidity of the development in the art of railroading. It has indeed become the most important organization in our modern complex life. It is almost unnecessary to point out its bearing upon the unification of our institutions. If it were not for the railroad a condition might develop on this continent similar to that which obtains in Europe, where a journey of a few miles may bring you amongst a different race of people, speaking a different language. Those very conditions, I believe, were largely responsible for the recent troubles in Europe. It is the ease of transportation on this continent which will prevent a similar situation from arising here.

A few railroad statistics may be of interest. In the United States there are, approximately, 1,800,000 railroad employees. It is worthy of note that they comprise about 7 or 8 per cent. of the total number of wage earners in the United States. In 1917 the compensation of these railroad employees amounted to about $1,000 per person for the year, or a total bill of $1,800,000,000. That was before the higher scale of compensation was put into effect. There are 260,000 miles of railroad and the capital investment represented is, approximately, $17,000,000,000, or $65,000 per mile. The railroads of the United States use about 150,000,000 tons of coal per year, and the total coal mined amounts to 600,000,000 tons—so that the railroads use approximately 25 per cent. It is also interesting to note that they use about 10 per cent. of their efforts in hauling coal to haul the rest of the freight. In other words, if the haulage of locomotive coal could be eliminated, the capacity of the railroads would be increased about 10 per cent. Herein lies one of the arguments for electrification. Another striking fact to note is that, as shown by statistics, it takes about 6 lbs. of coal in a steam locomotive to produce 1 horse power of energy, while the same amount of coal, if used in a modern central station, would produce two, or, under the best conditions, three, and even four, times that amount of energy. In other words, the steam locomotive efficiency is only one-half to one-third that of the central station. Instead, therefore, of using 150,000,000 tons of coal per year to operate our railroads, the same service could be rendered by the central station, through electrification, with a reduction of 75,000,000 tons of coal, or perhaps, even a reduction of 100,000,000 tons.

Let me quote, in this connection, from a recent statement of Mr. E. W. Rice, Jr., when president of the American Institute of Electrical Engineers. Mr. Rice said

"While the amount of coal in our country is enormous, it is definitely limited. While Providence has blessed us with a princely amount of potential riches in our coal beds, it is known that there is a finite limit to the amount of coal so stored and when this coal is once exhausted, it is gone forever. It is really terrifying to realize that 25 per cent. of the total amount of coal which we are digging from the earth each year is burned to operate our railroads under such inefficient conditions that an average of at least six pounds of coal is required per horse power-hour of work performed.

"The same amount of coal burned in a modern central power station would produce an equivalent of three times that amount of power in the motors of an electric locomotive, even including all the losses of generation and transmission from the source of power to the locomotive. Where water power may be utilized, as in our mountainous districts in the West, all of the coal used for steam locomotives can be saved. In the Middle and Eastern states, however, water powers are not sufficient, and it will be necessary in a universal scheme of electrification that the locomotives be operated from steam turbine stations, but as I have already stated, the operation of the electrified railroads from steam turbine stations will result in the saving of two-thirds of the coal now employed for equivalent tonnage movement by steam locomotives.

"We would not be justified in being so confident of the benefits of electrication of railroads if every element in the problem had not been solved in a thoroughly practical manner. The electric generating power stations, operated either by water or by steam turbines, have reached the highest degree of perfection, efficiency and reliability, while the transmission of electricity over long distances, with reliability, has become a commonplace. Electric locomotives capable of hauling the heaviest trains at the highest speeds, up and down the heaviest grades, have been built and found in practical operation to meet every requirement of an exacting service. There is, therefore, no element of uncertainty, nothing experimental or problematical, which should cause us to hesitate in pressing our claims upon the attention of the country. Electrification of railroads has progressed with relative slowness during these many years, waiting upon the development and perfection of all of the processes of generation and transmission and of the perfection of the electric locomotive itself. When all these elements had been perfected, as they now have been for several years, the railroads found themselves without the necessary capital to make the investment."

Electric locomotives are capable of hauling the heaviest trains up the steepest grades at the highest rates of speed. There is, therefore, no uncertainty as to the engineering success of electrification. But, while the engineering problems have been solved, we find the railroads without sufficient capital to make the investment required.

The steam locomotives on our railroads are necessarily non-condensing machines. The impossibility of using condensers results in a waste of 30 to 50 per cent. of the available energy in the fuel. Owing to the weight and cost of condensers they can only be employed in the central station.

The electrification of our railroads has already been started, and considerable progress has been made. We know now that we must do more than solve the engineering problems; electrification must not only be an engineering success—it must be an economic success. In other words, the dollars spent on railroad electrification must show a return that will justify the investment. This can not be shown for all conditions, but it can be for certain specific cases, and it is these cases that form the entering wedge which will ultimately result in the application of electrification to our national system.

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*Before the Electric Club of Toronto.

There are three places on the railroads where electrification is particularly desirable. In the first place, it is of particular advantage in heavy grade sections, on account of its ability to haul heavier trains at higher speeds. The heavy grades are, so to speak, the neck of the bottle, limiting the capacity of the sections on which they are located, and since electrification can materially increase their capacity, there grade sections lend themselves to profitable electrification. One outstanding instance of this is on the Norfolk and Western line in West Virginia on the Elkhorn Hill, where there is a grade of about 2 per cent. for some 30 miles. This section was electrified several years ago and its capacity was increased to about double what it had been with steam. They are now hauling electric trains weighing about 5,000 tons at 14 miles an hour. This line, as you know, is a coal road, hauling coal from West Virginia to the port of Norfolk. In that particular case, the grade dictated the electrification, and it is a thorough success, both from an engineering and a commercial standpoint.

One other well-known road on which the grade was the reason for electrification was the Chicago, Milwaukee and St. Paul Ry. This road electrified that section of its line which crosses the mountains of Montana, there being three mountain ranges to cross in a run of about 440 miles. The electrification was carried out about four years ago, the first section having been installed by the General Electric Co., and it has proved a decided success. Power is purchased from the Montana Power Co. This same road also has authorized the electrification of another very heavy grade division in the State of Washington over the Cascade Mountains. The work has been delayed owing to the war, but it is expected that this section will also be in operation within the next four months.

Another place on the steam railroad where electrification is called for is in the tunnels. This is because the steam locomotive becomes dangerous in a tunnel, particularly where there is a heavy grade. There are cases on record where the crews of the locomotives have been suffocated, owing to the accumulation of gases when the engine stalled. One notable instance of this was in the Sarnia Tunnel under the St. Clair River. This tunnel has been electrified, as has also another tunnel at Detroit, for the same reason. The same is true of the tunnel of the Great Northern Ry. in Washington, which is five or six miles long. The tunnels have thus been isolated from the rest of the line and electrified, owing to the menace to life created by the use of steam locomotives in them.

The third place where electrification has been demanded is in the large city terminal. This was first forced upon the attention of the public in New York City. Many will remember how, some 16 or 18 years ago, a serious accident took place in N. Y. as a result of the signals being obscured by the steam and gases from the preceding locomotive. Many people were killed and public opinion was aroused to such a degree that the Legislature of New York State passed a law requiring that all railroads entering New York City should be electrified by a certain date. The date so fixed was, as I recall it, Jan. 1, 1907. In that way the question of electrification was brought to the front at a time when the art was not developed sufficiently to cope with such a large problem. The New York Central attacked it and adopted the same method as was used on our street railways, using 500 or 600 volts direct current, and the results have been very successful.

It is recognized, however that this method of electrification, while highly successful as a terminal electrification, cannot be applied to the entire length of trunk lines, and does not provide a solution to the problem of electrifying the railroads as a whole. Some years ago when the Pennsylvania Railroad established a terminal in New York City, they applied the same method as the New York Central, using the 650-volt direct current system, but I think it was announced by the Board of Directors at that time that this was not intended as a precedent for the electrification of their trunk lines, but was merely a terminal undertaking.

Another road coming into the Grand Central Terminal at New York was the New York, New Haven and Hartford. This road's engineers gave the matter of electrification due consideration and adopted a different solution. They took the position that whatever system was adopted should be capable of extension to the entire road, and they decided on the alternating-current, single-phase method. This was the first application of this method and they had many difficulties to overcome. However, they passed through the pioneer period and their efforts have met with success. They first electrified the road as far as Stamford—about 35 miles—and later to New Haven—about 75 miles from New York. It is the intention also to extend the electrification to Boston and, ultimately, to apply it to the whole system.

This brings me to the question of the proper method or system of electrification. I don't think it is a matter that should be unduly emphasized. There has been too much energy spent by railway engineers in damning some other man's method. The main thing is to bring home the necessity of electrification by any method. Still, it is necessary to give consideration to the different systems. The New York, New Haven and Hartford used a 11,000 volt trolley, and an alternating current motor, which, however, was capable of using either alternating or direct current. The necessity of operating in both ways caused considerable complication, but the troubles thus entailed were overcome and the method is proving very successful and would have been extended much further had it not been for certain financial difficulties into which the road has fallen. This electrification stands to-day as typical of the alternating current method.

The greatest example of the direct-current method is the Chicago, Milwaukee & St. Paul electrification. In this case the engineers considered the best method was an extension of the recognized standard system used by the street railways. That is, they have obtained direct current from an alternating current supply, but the voltage adopted was much higher than used by the usual street railway.

Let us look, for a moment, at the development of street railway electrification. It was first started in Richmond, Va., by Mr. Frank Sprague in 1887, who did the pioneer work and made good. As a result street railway electrification grew with great rapidity and within ten years trolley lines were radiating all over the country. As the trolleys expanded and the cars grew heavier, it was found that 500 volts, as originally adopted, was not sufficient and the voltage was raised to 600 and then to 750. Then some engineer suggested doubling the distributing voltage, that is, going to 1,200 volts, and that worked alright. Later, on the advice of the engineers of the General Electric Company, the voltage was doubled again, and 2,400 volts was adopted on the Butte, Anaconda and Pacific, and, after successful operation, a still further increase was suggested, with the result that the Chicago, Milwaukee and St. Paul adopted 3,000 volts, direct current, which has proved very successful. The work of the engineers of the General Electric Co. on the latter electrification, has been extremely creditable, and their troubles were remarkably few. The current is distributed from the sub-stations at 3,000 volts and is obtained from a general a.c. supply system at 60 cycles.

One other system worthy of comment is that used in the Great Northern tunnel in Washington. In that case they used a 3-phase, alternating current system, with two overhead trolleys. The motors on the locomotive were three-phase. Still a different system was employed by the Norfolk and Western. They operate with a single-phase line, but convert it to a three-phase current on the locomotives and use motors of the same constant speed characteristics. The Great Northern tunnel is the only instance in which a three-phase line is directly used on this continent. On the Italian railroads, however, which have been electrified to a large extent, they use polyphase motors exclusively on their locomotives, entailing two overhead trolleys. American engineers, in general, think the employment of two trolleys inadmissible. For my own part, I consider that the two overhead trolleys, differing in potential, introduce too many problems to make for the highest efficiency.

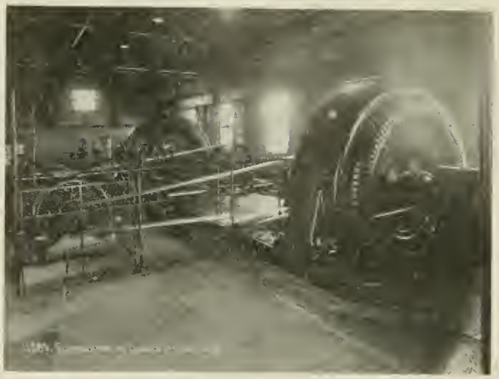
There are then these three methods of electrification, which are open to the engineers of the railroads when they come to look at the problem of electrifying their lines. All of them are good. It is going to be necessary for the engineers to choose between them, but I do not believe that in doing so they should lay stress upon the differences of the systems, but rather they should make the general advantages of electrification understood no matter by what method it is carried out. The fact that stands out is that the railroads are now using 25 per cent. of the coal mined and that amount might be reduced from one-half to two-thirds by the general adoption of electrification, and further, that when operating by electricity, our water powers may be used. Once we burn our coal it is gone forever, but our water powers are gone forever only so long as they are not used. It is an economic crime to let our water power run to waste, and I believe the time will come when posterity will not bless us for having been so lavish with the resources at our disposal.

"Power Factor" Correction on Hydro Lines

For the purpose of power factor improvement, the Hydro Electric Power Commission of Ontario have recently installed at their Toronto Terminal Station, two 4,000 kv.a. synchronous condensers each equipped with its own exciter driven by a belt from the shaft of the condenser. Special tests were made to determine the effectiveness of these machines from which tests the following figures were obtained:—

	Condensers both off	One Condenser running	Both Condensers running
Input to consumers, kw.	0	310.0	619.5
Input to condensers, kv.a	0	3450.0	7052.0
Total excitation in kilowatts	0	39.41	76.15
Power-factor Toronto station load (lag)	76.4%	81.0 %	86.0 %
Power-factor of total Hydro load, measured at Niagara	84.9%	85.4 %	88.6 %
Power-factor of condenser bus		9.0 %	8.78%
Wattless factor, Toronto station load	64.5%	58.5 %	51.0 %

It will be noted that the power-factor of the Toronto Station load is raised, by the use of these condensers, from 76.4 per cent. to 86.0 per cent. The effect is more noticeable if the wattless factors be considered, for then one finds that this factor suffers a 21 per cent. reduction. For a given kilowatt load on the Toronto Station such an improvement in power-factor reduced considerably the line losses between Dundas and Toronto, and to a lesser degree the losses on the lines from Niagara Falls transformer station to Dundas.


Condensers in Terminal Station

These condensers are connected to the 13,200 volt bus in Toronto station and, as a result, any improvement in the power-factor of this bus, means a reduction in the kv.a load carried by the step-down transformers between the 110,000 volt line and the bus. In other words the total kilowatt capacity of the station is increased,—about 12 per cent.

In addition to increasing the capacity of the station, the condensers very much improve the voltage regulation at the Toronto end of the transmission line.

Electrical Engineers, Limited

Electrical Engineers, Limited, is a new company formed in Calgary for the purpose of carrying on business as manufacturers' agents and general consulting engineers. They have already made desirable arrangements in a number of lines, but have not definitely closed for meters, transformers, centrifugal pumps, fans and blowers. The territory to be covered regularly is the province of Alberta and the Crow's Nest district in British Columbia, with, possibly, adjacent territory in Saskatchewan. The firm has already established itself in the consulting engineering business, and has a shop to take care of repair work; the engineer in charge of the service department had four years' experience in the Canadian Westinghouse factory and eight years with the city of Calgary as repair man and meter expert. The general manager of the new company is Lieut. Guy Morton, who returned from France only a few weeks ago. Lieut. Morton is a graduate of the University of Toronto, (1909) in the Faculty of Applied Science and Engineering, and, before the war, was branch manager, at Calgary, of the Canadian Westinghouse Company, and otherwise prominent in the business and social life of that city. The company's offices are at 202 I.O.O.F. Building, Calgary.

The overseas members of the staff of the Shawinigan Water & Power Company celebrated Armistice Day, Nov. 11, by a dinner at the Engineers' Club, Montreal. Sergt.-Major Wood presided. The toasts were: "The King," "Our Fallen Comrades," "The Navy, Army and Air Force," and "the officials and ladies of the Company who remembered the boys in France."

Your window is the magnet of your trade. It stands a good chance of drawing a $35 prize as well.

CANADA'S COAL

There is much concern in Canada, particularly in Ontario, which province depends largely upon imported coal, over the source of coal supply for the present winter, because of the strike situation in the United States.

Just why this worry should make itself manifest seems somewhat of a mystery, when one stops for a moment to consider and investigate the situation. In Alberta we have 16 per cent. of the total supply of coal in the whole world. The heating value of Western coal has been tested by householders, manufacturers, railways, and power plants throughout Western Canada, and all concerned have found Western coal an economical and efficient fuel. Steam coal produced in the Crow's Nest Pass district compares very favorably with the very best United States steam coal, and big concerns like the Canadian Pacific Railway, the T. Eaton Company and the Winnipeg Electric Railway Company have adopted the use of this coal because of its qualities as an efficient fuel, linked up with a big saving in the annual coal bill. In Alberta we have over 300 mines, many of which are equipped with the most modern equipment, costing millions of dollars, and yet the annual production of these mines is only 40 per cent. of what could actually be produced. This is because of a lack of a market that can take all the coal mined. At present Western Canada imports about 3,000,000 tons of coal annually, valued at $18,000,000. This huge sum of money is sent to the United States to pay for coal imported into this country. That money assists to develop United States industry. It helps to keep the overhead expenses of the mines low because of the fact that the more coal produced means less overhead expense. Again, by sending this $18,000,000 out of Canada we are very materially affecting our already heavy adverse trade balance. The fact should not be lost sight of, too, that on this $18,000,000 we must pay $720,000 in exchange alone.

The whole trouble why Western coal operators have not made more headway in marketing their product is owing to a lack of educational propaganda—as it were, to a lack of pep. They have the product, the men, the equipment, and the market. But the operators must be assisted in their problems by everybody concerned in the welfare of the future of Canada. Daily and trade papers, boards of trade, wholesale and retail coal dealers, all must spread the propaganda that we have in Western Canada coal that has been tested and found to be equal to that which has been imported for so long. Emphasis should be laid on the following facts: one of Canada's principal industries will be materially assisted to develop; millions of money will be kept in the country and so help our adverse trade balance; equally as good heating values can be obtained from Western coal as from imported coal; the more Western coal used, the lower the overhead at the mines, and consequently lower to the consumer.

Alberta operators complain, and justly too, that their overhead expenses are very high through their inability to secure a market for slack coal, which is now merely thrown away. For instance, smaller mines in the Lethbridge field waste 50,000 tons of this product annually. Slack coal can be utilized to advantage in power plants. Such plants at Regina, Saskatoon and Winnipeg have burned this fuel with great success.

Another factor that is keeping back the development of the coal mining industry of the West is the high freight rate applied to all grades of coal, especially on slack coal.

The "Western Canada Coal Review" in a recent editorial criticized very severely the actions of the Dominion Government and the Provincial Government of Manitoba in asking for bids for coal specifying that only United States coal was required. Why this discrimination? Why this encouragement to buy in foreign markets when an equal product is at our own doorstep? Why this apathy to our severe adverse trade balance? Why this discouragement of the development of our natural resources? Why this apathy towards assisting the employment problem in Canada? Perhaps the Government officials can answer.

As an instance of ignorance of even many Winnipeg manufacturers of the burning qualities of Western coal, a certain representative of a large coal mine visited Winnipeg in the Fall of 1918, and found a manufacturer was contemplating placing a big order for the best American steam coal to heat his power plant, not giving any consideration whatever to Canadian coal. After talking over the possibilities of burning Alberta coal in his plant, he decided to give it a trial. This year, the same manufacturer without any hesitation whatever, promptly gave this same mine another big order for his coal supply for the winter of 1919, saying only one word in reply to the mine's representative of what he thought of the coal: "WONDERFUL."

At present Ontario is faced with what looks like a fuel famine. Why should this be? At the moment of writing there are stored at the head of the lakes 250,000 tons of soft coal and 324,000 tons of anthracite, with additional shipments arriving as lake steamers arrive. Now, why should there be a shortage in Ontario when this supply is lying at the lakes ready for shipment into Western Canada? Does not this importation seem like "Carrying Coals to Newcastle"? Why should the Ontario Fuel Commissioner not commandeer all of this coal and divert it to Ontario and so help the serious fuel situation in this province?

Are we to sit still and smile, or act? Which is it to be?

The Contractor-Dealer

What Is the Fair Overhead to Charge?—Should It Be the Same for All Jobs or Vary With the Size—The Chicago Estimators' Association Supply an Answer

From time to time we have spoken of the work of the Chicago Estimators' Association, which was formed a couple of years ago to make a study of the various overhead percentages, which were properly applicable to electrical contracting jobs of varying value. The work of the association to date was explained before the recent contractors' convention in Milwaukee, by Mr. Morley, a member of the Estimators' Association. Mr. Morley first outlined briefly how the data upon which they based their conclusions were obtained.

The committee decided that a curve of "overhead" should be developed. At first it was intended to base this curve on the ratio of the cost of carrying on business to the yearly volume of sales, but it was soon discovered that such a curve could not be plotted as work of different cost values carried entirely different overhead costs, and a curve showing the percentage to be added for different construction costs was then decided upon.

In order to obtain data with which to work, questionnaires were sent to contractors requesting information as to yearly volume of business and the items of cost of carrying on the business which cannot, on account of their nature, be apportioned directly to the jobs—rent, heat, office salaries, stationery, telephone and many other items of like nature.

About a dozen replies were received and with this information the committee proceeded in the following manner:

A 10 per cent. profit over selling cost was assumed for each yearly volume of business. Deducting this profit gave the selling cost. Each questionnaire gave the overhead cost. Deducting this cost from the selling cost gave the construction cost.

This construction cost for each questionnaire was divided into hypothetical contracts of various numbers and costs from $25.00 to $10,000, depending on the yearly volume of business. The division was made by each member of the committee and the results obtained averaged.

Percentages of overhead were then assigned the different sized contracts according to their size, in a manner that the total overhead for all the contracts for each questionnaire equalled the amount reported for same.

A great amount of work was required to find percentages which would apply to the same cost amounts for all questionnaires and bring the total overhead cost the same as given in each questionnaire. When these percentages were found a curve was plotted.

Starting at $200.00 with 52%, the curve falls rapidly to 42% at $500.00, 36% at $1,000, 29% at $2,000, and then more gradually to 25% at $3,000, 22.5% at $4,000, 21% at $5,000 and still more graduall, to 18.7% at $7,000, 16.2% at $10,000 and 14.5% at $15,000. Proceeding to higher values, we find a still more gradual decline to 13.2% at $20,000, 10.2% at $40,000, 9% at $100,000 and 8.5% at $160,000, beyond which the curve is practically a horizontal line.

In using these percentages it must be borne in mind that they apply to the estimated construction cost, which must include the items as given in the table of overhead percentage.

Construction Cost

The items entering into the construction cost are: Material taken from plans and specifications, labor, installing and handling material, supervising of foreman, time clerk and stock clerk where the size of contract requires same, travel time and expense, meaning carfare and time lost where work is out of town and not far enough to board the men, board when necessary, freight and cartage, plans and drawings, delays caused by other contractors, cutting and patching, painting conduit if required, inspection and license fees, bond if required, insurance, fire and accident, pro rata charges if any, watchman, telephone service and storage if

TABLE OF OVERHEAD COSTS

Estimate Sheet Cost	Over-head %	Estimate Sheet Cost	Over-head %
$ 200	52.0	$ 2,900	25.4
250	48.5	3,000	25.0
300	46.6	3,500	23.6
350	45.3	4,000	22.5
400	44.0	4,500	21.7
450	43.0	5,000	21.0
500	42.0	5,500	20.3
550	41.2	6,000	19.7
600	40.5	6,500	19.2
650	39.8	7,000	18.7
700	39.2	7,500	18.2
750	38.5	8,000	17.8
800	37.9	8,500	17.4
850	37.4	9,000	17.0
900	36.9	9,500	16.6
950	36.4	10,000	16.2
1,000	36.0	11,000	15.5
1,100	35.0	12,000	15.0
1,200	34.2	13,000	14.7
1,300	33.4	14,000	14.5
1,400	32.7	15,000	14.3
1,500	32.0	20,000	13.2
1,600	31.3	25,000	12.2
1,700	30.7	30,000	11.5
1,800	30.4	35,000	11.0
1,900	29.5	40,000	10.8
2,000	29.0	45,000	10.6
2,100	28.5	50,000	10.4
2,200	28.0	60,000	10.0
2,300	27.6	70,000	9.6
2,400	27.2	80,000	9.3
2,500	26.8	90,000	9.4
2,600	26.1	100,000	9.0
2,700	26.0	130,000	8.7
2,800	25.7	160,000	8.5

Here's a Christmas Present for You

YOUR WINDOW DISPLAY IS YOUR BEST SALESMAN

Between now and Christmas the Electrical-Dealers of Canada will be putting forth their best efforts to attract the holiday trade and some fine window displays will be shown.

The biggest problem before the electrical industry to-day is not engineering or manufacturing—the real problem is "merchandising."

We believe that well dressed windows—goods properly and tastefully displayed and demonstrated—are the most effective means of increasing the sale of electrical appliances.

With a view to encouraging the art of window dressing among electrical contractor-dealers, and, also, having in mind the value of the interchange of good merchandising ideas, the Electrical News offers four prizes for best dressed windows, under the following conditions:

(1)	First prize	$35.00
	Second prize	20.00
	Third prize	10.00
	Fourth prize	5.00

(2) The contest is open to any electrical contractor-dealer, municipality or central station in Canada.

(3) Photographs of window displays must be in our hands by December 31, 1919.

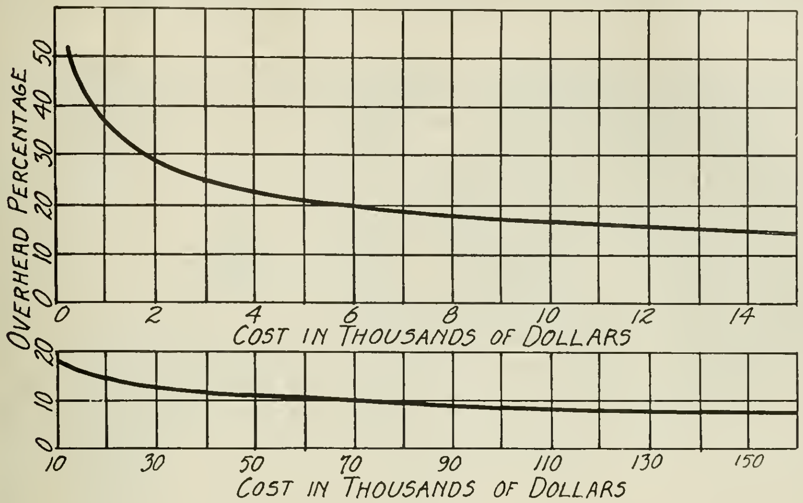
(4) Explanatory notes up to 100 words may be submitted with each photograph.

(5) The merits of the photographs will be judged by an impartial committee of three—one manufacturer, one jobber, one contractor-dealer.

Plan now to enter the competition. You have an even chance to win a prize. In addition to that, however, it is a dead certainty that your effort to produce a better window display will be reflected in your more abundant Christmas trade.

Address photographs and all communications:

"Best Window" Contest,
Electrical News,
347 Adelaide St. W., Toronto.



Upper curve shows overhead percentages on jobs up to $15,000. Lower curve shows percentages on jobs from $10,000 to $160,000.

required. These are all items which must be allowed for in construction cost and not left for overhead.

Mr. Morley gave the preceding table as a result of his association's investigations, covering estimate sheet cost varying from $200 up to $160,000, the overhead percentages varying the other way, from 52 per cent. down to 8.5 per cent. These figures are shown in diagram also herewith.

Attention was also drawn to the fact that the Estimators' Association has been working on a standard specification to be used for such work as will not warrant the services of an engineer. It was stated that they expected to have this specification ready within a year.

Another item brought up was that of improving the present system of symbols. It was pointed out that the symbols in use to-day were adopted some 15 or 20 years ago and that some of them, such as the base, floor, push and telephone outlets, should never have been introduced, as their resemblance to the building lines makes them difficult to locate. The speaker explained the symbols which his association had decided to use, and, in submitting them to the contractors, made the request that they appoint a committee to work with architects and consulting engineers with the object of adopting standard symbols universally.

"Sault" Contractors Organizing

The contractor-dealers of Sault Ste. Marie, Ont., recently held a meeting to discuss the question of organization. Mr. McIntyre, president of the Ontario Association, has since outlined to them the plan of organization which enables them to come in on the district basis, and it is hoped that they will see fit in the near future to take this important step.

Do you believe you can dress an attractive, business-pulling window. Show your confidence in your own ability by entering the "Best Window" contest.

Electrical Jobbers' Activities

A well attended and enthusiastic meeting of the Canadian Electrical Supply Jobbers' Association was held at the Royal Connaught Hotel, Hamilton, on Monday, November 17th, 1919, Mr. M. K. Pike in the chair. This association was organized last spring for the purpose of promoting good will and co-operation among its members and between the jobbers as a whole and the various other branches of the Electrical Industry. The different divisions of the association have been holding frequent local meetings but this was the first general meeting of the association since its organization. The meeting was exceptionally well attended, only four or five members being absent, which is considered a remarkably good showing when it is realized that this organization covers the whole of Canada, having members as far east as Halifax and as far west as Vancouver.

The morning session was devoted to association business and adjourned at 12.30 for lunch, on which occasion the members were the guests of Mr. Moncur of the James Moncur Electrical Co., the only member having headquarters at Hamilton. The meeting was again called to order at 2 p.m. to hear an address by Mr. Kenneth A. McIntyre, Chairman of the Ontario Association of Electrical Contractors & Dealers, who had been invited to speak to the members on the subject of "Co-operation between the Jobbers and Contractor-Dealers." Mr. McIntyre briefly outlined the Goodwin organization scheme, pointing out that there were the four links in the chain—(1) the district; (2) the province; (3) Canadian division; (4) the National Association. As to the situation to-day, he pointed out that British Columbia was organized and affiliated, and that the Ontario organization was already provided, though Toronto was the only district yet formed. They were, however, negotiating with Hamilton, Brantford and Kitchener, and would tackle other districts later.

How the Jobbers' Association Can Help

Mr. McIntyre enumerated the ways in which the jobbers could help:

(a) By realizing that the final success can only come with the complete organization of the entire industry.

(b) By becoming associate members of the contractor-dealers' organization.

(c) By attending, and having their salesmen attend, their meetings, thus making them better salesmen because of their increased knowledge of their customers' problems.

(d) By listing their contractor-dealers customers and checking them to ascertain the names of those not belonging to the contractor-dealers' association.

(e) By making a direct effort to get these customers to join, pointing out to them that it is their duty and also greatly to their advantage.

(f) By informing the contractor-dealers' association as to the names of such non-members, so that they could supplement their efforts.

(g) By arranging for a joint secretary.

The chairman then spoke briefly, thanking Mr. McIntyre for the address, complimenting him on the interesting points brought out, and expressing the desire of the members of the Jobbers' Association to co-operate in every way possible with the contractors and dealers for the betterment of the industry as a whole.

When the afternoon session was over the members left Hamilton in a body to attend the meeting of the Electrical Supply Jobbers' Association of the United States, which was holding a three days' general meeting at Cleveland, Ohio. The Cleveland meeting was a great success and of considerable interest to the members of the Canadian Association, as the objects of these two associations are similar and the problems met with in the United States are much the same as those in Canada.

Mr. Wakeman Visits Canada

A large and representative gathering of electrical men of Toronto met on Monday evening, Nov. 24, to hear an address by Mr. J. M. Wakeman, general manager of the Society for Electrical Development, who was visiting Toronto for two or three days on certain business matters connected with his society. Mr. Wakeman delighted his hearers as he unfolded the plans of his organization for the popularization of the use of electrical appliances throughout the homes of Canada and the United States, and, at the same time, convinced them that very splendid results had been accomplished in the period of six short years. Mr. Wakeman spoke of the assistance rendered by the society to its members, the advertising copy supplied, the information available on practically every phase of electrical merchandising and the general publicity work in popular magazines and newspapers. One of the most valuable ideas that has been taken up by the society is the production of a movie play, placed in a setting not unlike that of the good old story of Rip Van Winkle. The centre figure in this play was a criminal who had been sentenced to 25 years' imprisonment and was only released in the year of grace, 1919. The picture shows him being introduced to the various electrical developments, one by one, that have taken place during the last 25 years. It finally ends up with a meeting of old friends, dining amidst all the conveniences and luxuries of modern electric table appliances. Mr. Wakeman also spoke of the work that had been done to combat the idea so often suggested by newspapers, municipal authorities and others, that fires (which cannot be readily attributed to any cause) must have had their source in faulty electric wiring or electrical devices. This and other instances convinced his hearers that the work of the society was invaluable and must be carried into Canada with more vigor than has been possible in the past.

At the conclusion of the meeting application forms were passed around and indications are that the society will have a number of new members from the Toronto district.

The Ontario Association Gains Strength

Word has been received from Mr. C. D. Henderson, of the Telephone City Electric Club, Brantford, who, with Messrs. McLean and Perry, the president and secretary of the club, were a committee of three to consider the advisability of forming a district branch of the Ontario Association of Electrical Contractors and Dealers, that a unanimous decision was reached on the evening of November 17th to establish a district branch with Brantford as the centre. The Telephone City Electric Club is to be congratulated on the step taken, as it is the first district to join up under the recently determined plan of provincial organization. The scheme, roughly, is that the province shall be divided into districts or sections, each represented in a parent association—the Ontario Association of Electrical Contractors & Dealers. In this way local matters occupy the attention of local organizations only, and it is only when matters of general interest are under discussion that the provincial executive or the association as a whole will be asked to pass judgment.

At least two other districts, already formed, are considering the question of amalgamation with the Ontario Association, under this scheme of organization, and other districts are in prospect of formation. The biggest difficulties appear to have been overcome, namely, arousing the interest of the individual contractors and dealers, and convincing them that the present scheme of organization offers greater advantages than ony other that has been suggested. The Ontario Association is now on the high road to success and, as it gathers strength by the addition of districts here and there throughout the province, is bound to become a powerful agent for improving conditions in the whole electrical field.

Training Their Foremen

The Crocker-Wheeler Company of Ampere, New Jersey, has just inaugurated a plan of training for their foremen and other factory supervisors which is of considerable interest. A group of 62 men has been formed to pursue a three months' course in Modern Production Methods, which comprises the study of specially-prepared text units, the solution of problems relating to the units, and the discussion of this material at six bi-weekly meetings held after hours in the plant. These meetings will provide an opportunity to bring home the application of the work to the special problems of Crocker-Wheeler production. At each meeting a lecture will be delivered by an experienced production man and the lectures will be followed by a round-table discussion. Included in the group, besides foremen, are the superintendent and three assistant superintendents, which insures that the meetings will be highly resultful to the members of the class. The subjects to be studied are:

How to promote team work in the shop.

Handling men in a way to increase production and promote harmony.

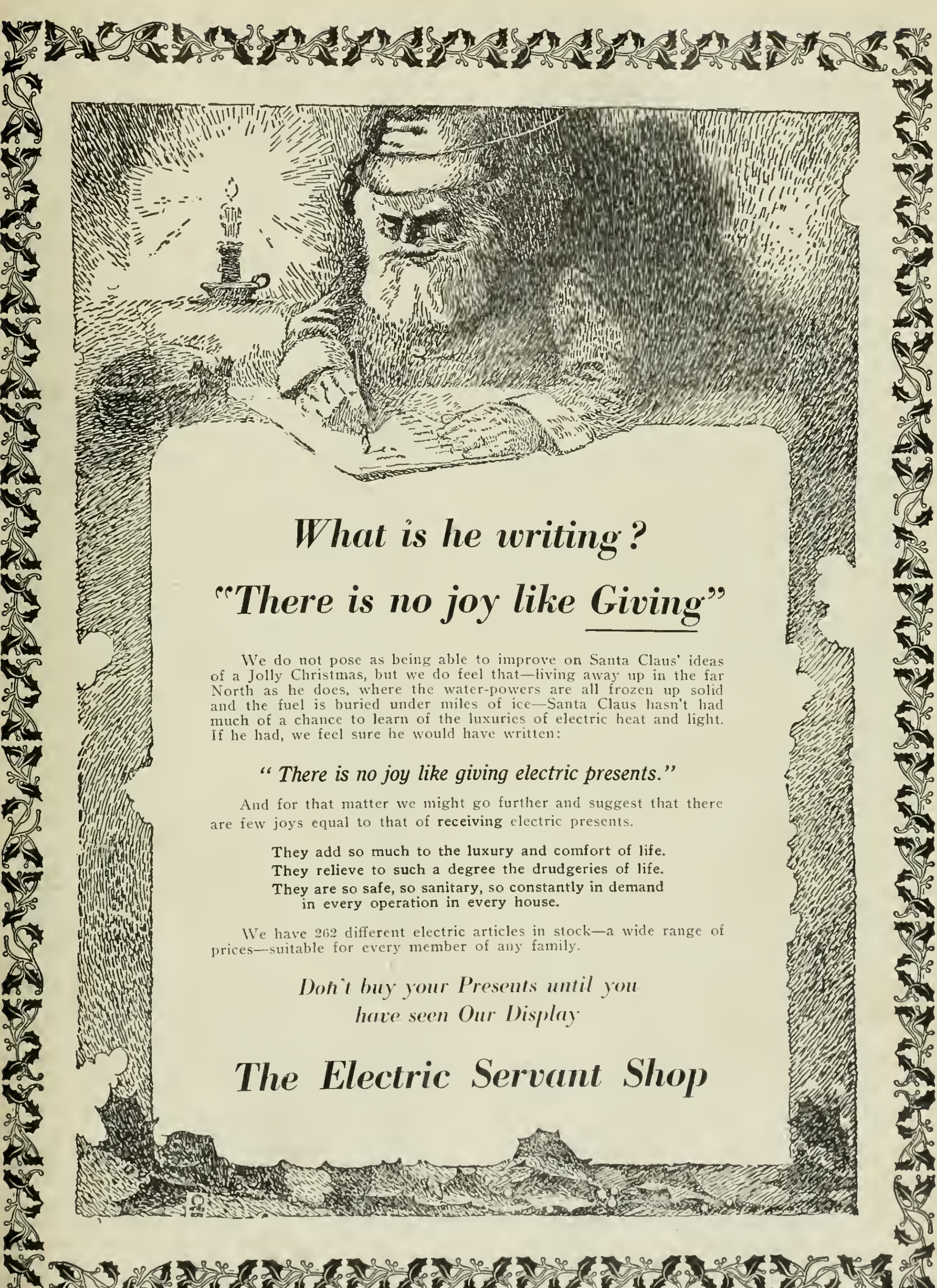
How production should be organized.

Efficient purchasing, scheduling, routing, repairing, etc.

Keeping down the overhead by stricter cost keeping.

Major problems of management.

Have you laid your plans to enter the "Best Window" competition?



What is he writing?

"There is no joy like Giving"

We do not pose as being able to improve on Santa Claus' ideas of a Jolly Christmas, but we do feel that—living away up in the far North as he does, where the water-powers are all frozen up solid and the fuel is buried under miles of ice—Santa Claus hasn't had much of a chance to learn of the luxuries of electric heat and light. If he had, we feel sure he would have written:

" There is no joy like giving electric presents."

And for that matter we might go further and suggest that there are few joys equal to that of **receiving** electric presents.

They add so much to the luxury and comfort of life.
They relieve to such a degree the drudgeries of life.
They are so safe, so sanitary, so constantly in demand
in every operation in every house.

We have 262 different electric articles in stock—a wide range of prices—suitable for every member of any family.

Don't buy your Presents until you
have seen Our Display

The Electric Servant Shop

Suggestion for Christmas advertising for the Contractor-Dealer.

Big Cry for More Electric Stores

To Take Care of the Demand That Has Been Created

The big cry is for more electric merchants. The answer is always the same—we haven't the money to get started.

Doesn't such a reply ignore the fact that banks exist largely for the purpose of "selling" accommodations? If they don't sell their stock in trade, how can they exist any more than a grocer could live if he kept all his wares on his shelves The banker is anxious to lend. All he requires is security, and this security is not necessarily bonds or mortgages—it may just as readily be a record for honesty and fair dealing, a good reputation in the community, or a clear cut statement of your business, showing a fair profit.

If you have a proposition that looks to you to be straightforward and reasonable, don't hesitate to go to your banker and lay the whole matter before him. Here are some helpful suggestions by Mr. E. L. Seabrook, in the Electrical Contractor-Dealer. He heads his article, "Hiring Money—How to do it," and shows it is not generally as hard as it looks:

Mr. Sanders had just completed what were to him several good sized electrical contracts which had not been paid for, and several other fair sized pieces of work were about ready for him. He needed money if he was to continue discounting his bills. He saw but one way out of it, and that was borrowing the necessary funds. After considering the matter very carefully he went to the bank in which he kept his account.

"I want to borrow $800," he said to the cashier.

"What do you want this money for?" the cashier asked.

"I have just finished quite a lot of work. The payments are not yet due, it might be considered a sign of financial weakness if I should ask for payments immediately. I have recently made it a practice to discount my bills and I can save money by doing so within the next few days. I have some other work that is just about ready for me to start and I want to buy my material at the very best figure possible. It looks like good business if I can borrow at the rate of one-half of one per cent. a month and take the discount."

The cashier asked him if he could make a statement of his business affairs. He could and did so during the day. This statement showed how much he owed the supply houses, what was due him from others, and also the progress he was making in his business. He was definitely able to show his banker that the business was being conducted at a profit. He secured the loan.

The Banker's Business

This incident brings out several interesting points. The first is that it is the business of the banks to lend money. That is what they are in business for and are generally eager to lend money or "hiring it out," if you please, for a definite period. This is not the only way some banks make money for themselves, but it is the great source of their revenue. If banks did not loan money, they would be compelled to go out of existence. Furthermore, it is the business of the banks to loan money for legitimate business projects. That is primarily the object of their organization.

J. Pierpont Morgan said at one time, which is quoted by thousands of bankers: "Credit depends on character more than on capital." The size of the bank balance, nor the business, does not count so.much after all as the man. The loan is made to the man and not his bank account or business. One may be wealthy, but if he is dishonest the banker does not care to risk the loan.

Perhaps some electrical contractors may have the idea that it is poor business to borrow money from the bank. This is a big mistake, provided that money can be saved or credit maintained by such borrowing. Why do not more electrical contractors avail themselves of this privilege? Why do they misunderstand the very purpose for which banks exist, and also fear the banker? Why do they pay the penalties for being short of funds, impairing their credit, when "hiring from the bank" is possible on terms profitable to them as business men?

Three Essentials of Contracts

Is it because they look upon finance as a secondary feature of their business? It it because they are thinking in terms of contracts instead of dollars? They think of hiring labor to perform these contracts as a matter of course, but not of hiring money in the same way. Do they forget that there are three essential parts for every contract—labor, material, money. No one expects to pay spot cash for the material purchased, or do all the work with his own hands. Why not look upon money that must go into the contracts in some such way?

No doubt many readers will say to themselves that all of this sounds very simple, but that financing is not for them, they have no standing, so they think, at the bank. What security can they offer? Most men, if they are honest and industrious, have a standing at the local bank, whether they know it or not. The security desired may not consist of just what they think it does.

A well dressed window is a splendid salesman. It may also win you a $35 prize.

The story is told of a contractor that did some work for a well-known firm in one of the largest cities of the country; he did it so well that the firm wrote him the following letter:

"We have your letter enclosing certificates from the department of———and wish to thank you for the same.

"We note what you have to say in regard to the work of installation, and wish to say that it has been a real pleasure to the writer to work with you on this job. We shall be glad at any time to say a good word for you whenever it will be of service."

Incidentally this contractor showed the letter to the cashier of his bank without any thought of the impression it would make on him. He was feeling good because of the satisfaction he had given and that this satisfaction had been expressed to him in written form. The cashier asked for the privilege of making a copy of this letter. Naturally the contractor expressed his surprise and asked the reason. The cashier replied:

"With a copy of that letter in our files your credit in this bank will be increased $5,000."

This bank is one of the largest ones in the country, which shows that big banks are anxious to accommodate small borrowers.

In asking for a statement of the business the banker wants an evidence of character just as much as he does an evidence of weath. He is looking for good business judgment, whether the business investment has been leaking away or earning a profit, that you are not a loser, but a gainer. The only way to make a balance sheet that will get money from the bank is by good business methods, and in the main this means making money and not losing it.

Banker Has Something to Sell

For every electrical contractor who cannot borrow from the bank because of his credit standing, there are many who can but are afraid to try because they do not understand that the banker is a business man with something to sell, and is in business to hire out his funds the same as a supply house is in business to sell its merchandise. If a man has a good merchandising credit he can also secure credit at his bank, if he will go at it in the right way.

Two partners in an Ohio village doing a nice little business ran short of cash. They had some bills they wanted to pay at maturity. Very timidly they went to the banker and told their story frankly.

"How much money do you want?" asked the banker.

"About $1,400 would see us through if we could get it," said the bolder of the partners, while the other almost fell out of the chair, expecting the whole subject to be dismissed at once.

The banker said to them that their statement showed a fair business progress; he had naturally been watching them and their account. They worked hard, their customers spoke well of them; they owned their own homes and were not extravagant. He concluded by saying the bank would be very glad to loan the amount on their joint note.

Got Control of Business

In an Indiana town a partnership had to be dissolved and one of the partners was in a quandary as to how he could secure the necessary funds, even temporarily, to take over the entire business. As a last resort he thought about consulting his banker for advice and laid the proposition before him. The banker asked for a statement of the entire business and questioned the partner very closely, with the result that the bank advanced sufficient funds for this man to secure control of the business.

Leaving the Doors Unlocked

A salesman was talking to an old customer, upon whom he happened to drop in a few days before Christmas.

"Do you lock your doors when you leave your business in the evening?" the salesman queried.

"Why, of course. What a foolish question! Do you think I make so much money that I want to give it away?" replied the dealer.

"Well, I don't know," continued the salesman. "You may not be giving it away in just the sense you mean, but you are leaving things undone that amount to just the same thing. Now, just as I came along the street I noticed that your neighbor hardware merchant has a fine display of Christmas toys, electric trains, Christmas tree lighting outfits and so on—and he told me they were selling like hot cakes. Then over here your druggist neighbor is following the same lead. Yet you don't seem to care. There is no sign of these things in your window or even in your store. I thought, perhaps, you didn't care about money."

"Well now, I never thought about it just that way," replied the electrical dealer. "There seem to be such a lot of good ideas in the merchandising business that I get behind trying to keep up. But now you have gone so far as to criticize me I am going to keep you here until you give me some suggestions for my Christmas window."

"Oh, well now," said the salesman, "I don't hold myself up as knowing anything much about window dressing, but since you ask my advice I would say, first, that you need lots of color and light. Red and white and green are the Christmas colors that give the best effects. Then you want 'life' to your window—something moving, if possible—an aeroplane with a little model of old Santa Claus at the wheel, or an electric train with Santa Claus acting as engineer, or in some other capacity, or a fan blowing colored ribbons with Santa Claus heads on them. Work in a Santa Claus face or figure wherever you possibly can, so as to give the impression that all your goods are very much in favor with his Santanic Majesty. Then think of the electric toys and small appliances that you can display—all suitable for electrical gifts. Do you know that the Society for Electrical Development has a printed list of two hundred and sixty Christmas electrical suggestions? Get a copy of that list and bring those items to the fore in your displays."

The Final Appeal

Do your Christmas shopping early, do it early, mother dear, buy those gift cigars for father ere the cabbage leaves are sere; get the fancy ties for brother, all hand painted, nice and sweet, while the holly's in the window and the Jimcracks fill the street. Buy the cook an inlaid poker, lift the milkman from the dumps, get him, mother dear, some ribbons—pale pink ribbons for his pumps. Let us then be up and doing, bright and early, mother dear; we must buy cut glass and china for our brothers' Christmas cheer; we must do our shopping early, buy the toys with pizened paint, so that dearest little Willie may curl up and be a saint. Hook me up, my dearest mother; put my state wide hat on straight; we must hasten, we must hurry, or we'll be—alas—too late; ere the celluloid cuff boxes and the plush-bound tomes of lore, and the four-cent Christmas greetings all are gone for evermore. So let's hustle, dearest mother, let us swiftly hit the pike; to our Christmas shopping early let us make a gentle hike.

WALT MASON.

"Well you certainly have given me some inspiration," said the dealer. "I'll start that window to-morrow and you come down this way to-morrow night and tell me what you think of it."

"I'll do that willingly, but I must be off now; good night."

"Good night, and much obliged to you."

The next evening, the salesman, according to his promise, walked home past Mr. Dealer's store. What a transformation! The dealer had caught the spirit and, on his own initiative, had secured a small spruce tree, which fitted nicely into one corner of his window. This he had decorated appropriately with electric bulbs of varied color—small figures of Santa Claus, etc., and had clustered around the base a half dozen of his smaller electrical devices.

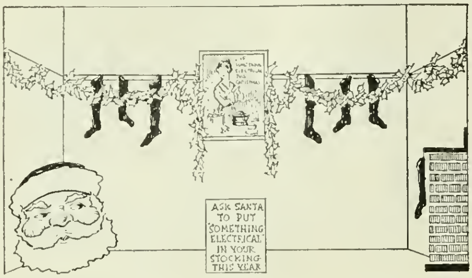
More than that—the salesman had some difficulty getting a view of the window; several children were gathered around it, ushering in the Christmas season with oo's and ah's, and importuning their parents to buy, and the store was better filled than the salesman had ever seen it.

His dealer friend was too busy to be interrupted so he turned his steps homeward, pondering deeply the possibilities of the electrical merchandising business.

It's not the value of the prize altogether—though $35 is useful enough these days. But think of the satifsaction of knowing your window is judged better than that other dealer's.

Christmas Window Suggestions

Make Your Store Front a Selling Magnet! Here Are Four Suggestions for Seasonable Window Trims that will Sell Your Goods to the Passerby


ASK SANTA TO PUT SOMETHING ELECTRICAL IN YOUR STOCKING THIS YEAR

No. 1

In No. 1, the suggestion is built around "Hang up the Christmas Stocking." The Christmas poster design is placed in the middle of the background. At each side are "stockings" cut from colored cardboard. Artificial holly is festooned across the background and ends and hangs in pendants near the poster.

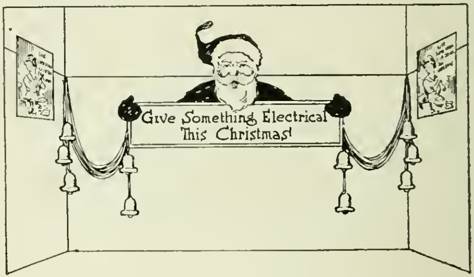
At the front of the window, against the glass, is a large cut-out Santa Claus head, made by your local card-writer. At the other side is the end of a fireplace. This is painted on heavy paper and fastened to the window glass.

The show-card says, "Ask Santa to put something Electrical in your stocking this year."

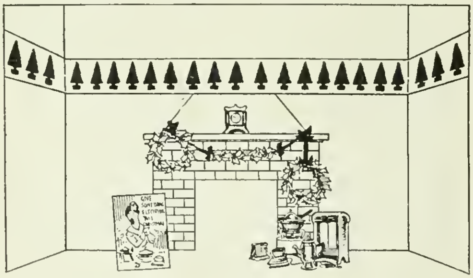
No. 2 has the head and shoulders of a large Santa Claus, with a panel card inscribed, "Give Something Electrical This Christmas," held in his hands.

Santa Claus is painted in color on heavy cardboard that is then cut out and fastened to the background. Red Christmas bells and festooning are hung from the panel and corners of the background. These can be bought from a stationery store. At the ends of the windows are Christmas Posters.

This is a seasonable idea, and tasty, yet easily and quickly prepared. It leaves unlimited scope to many different arrangements of the window floor.


Give Something Electrical This Christmas!

No. 2



No. 3

Across the background and ends in No. 3 extends a frieze of Christmas trees. These are of green with red bases on a white background.

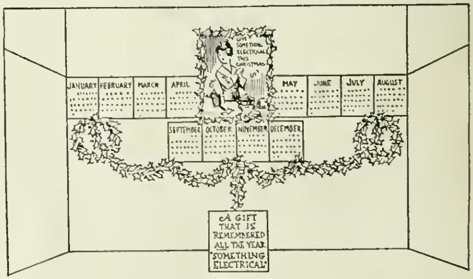
A fireplace is built against the background. This can be made by building a light frame-work and covering with crepe paper which comes in red with "bricks" lined across it.

The shelf can be made to look heavy by facing it with a strip of wood, 1½ inches wide. The chimney section above the mantel could be made of gray cardboard. Artificial holly and red ribbon are used for embellishment.

No. 4 has the Christmas Poster placed well up on the background with a border of artificial holly. Twelve panels representing the months of the year are the other features of the background. At each end is a wreath of artificial holly and from these extend festoons to the middle where a pendant is hung.

In the foreground, a show-card states, "A gift that is remembered all the year, 'something electrical'."

The panels and show-card can be obtained from a local show card writer and the holly from a stationery store.



No. 4

Suggestions Courtesy Society for Electrical Development.

Publicity, to Attract the Customer, Must be a Little Bit Out of the Ordinary

Advertising that is just a little out of the ordinary will often attract the eye or the attention of a prospective customer and transform him into a buyer. It is not necessary to be a buffoon or a "smart" guy. Originality, backed by a fair supply of gray matter in the person preparing the advertisement is all that is needed. Some examples are noted in Western advertising:

"A cigar dealer in Harrisburg arranged an exhaust from the motor of his delivery automobile so that it reached the tip of a huge cigar mounted on the roof. As the wagon goes about the city, the smoking cigar not only attracts attention, but indelibly impresses the name of the dealer upon all who see it.

An ice company solved the problem of proving the value of their ice by freezing a clock inside of a large cake of ice. This was then placed on the sidewalk with a sign reading: "See how long it takes our ice to melt."

A bank in the Middle West tried the experiment of placing a full-blooded cow on exhibition in the lobby, and 276 new accounts—the majority from farmers—were opened in a single day.

A clothing company in Indianapolis, Ind., secured fifty homing pigeons, attached to each one a tag entitling the finder to a suit of clothes, and then gave publicity to the project by widespread newspaper advertising. The result was an increase in sales which more than offset the cost of the pigeons and the suits which were given away.

Capitalizing the idea that crowds are always interested in action, the Moe Levy Company of New York makes it a point to change its window displays during the noon hour when the greatest number of people are on the streets. The window trimmer "carelessly" knocks over a figure and this in itself is sufficient to attract the crowd. After the display has been put in place, the manager comes outside, peers through the glass, and directs that certain changes be made. The crowd often takes such an interest in the proceedings that it will volunteer instructions as to the arrangements of the display."

Twenty serious retail leaks through which profits escape are listed by a retail specialist as follows:

Over-measurement of goods; reckless cutting of samples; non-avoidance of remnants; slothful care of stock; careless packing; improvident purchase and use of supplies; discarding empty cartons; shopworn goods through lack of suitable fixtures; poor arrangement of stores; extravagant illumination; pilfering of goods and money by employes; losses through incompetent window trimming; employing incompetent help; dissatisfied customers; carrying dead stock; poor buying; excessive alteration extras; poor advertising; poor bookkeeping, and passing discounts.

Probably no electrical retail business is suffering from all the twenty leaks, but most establishments can find two or three. Why not stop them up?

Sending mazda lamps by mail and adding the charge to the next bill for current is a convenience recently initiated by the Duquesne Light Company, Pittsburgh. The postal authorities will not insure the lamps, on the ground that they are too fragile, but the use of a special corrugated box package reduces breakage to a minimum, and the company undertakes to replace any lamps found defective if they are tested on receipt. A telephone call or postal card to the electric shop of the company brings by return mail as many lamps as the customer may require.

More lamps are used by people who have a case of spare lamps handy than by those who are accustomed to buy only two or three at a time. For this reason one electrical salesman has cultivated the habit of signing lamp contracts with small stores and factories for their yearly supply, instead of confining his attention solely to large lamp contracts.

A store which has an extra case of lamps on the premises will tend not to have empty sockets, whereas the custom of buying two or three lamps at a time induces postponement in the replacement of old or broken lamps.

The signing of lamp contracts with small stores brings in orders for cases of lamps and the owners of these do not make shift for an indefinite period with worn-out lamps and empty sockets. The result is an appreciable increase in lamp sales.

A convention idea which proved efficient and handy was the ticket book arranged by the American Society of Mechanical Engineers for its spring meeting. The book, which was about 4½ by 2½ inches, contained duplicate detachable tickets for every event of the convention. On the cover was an announcement to the effect that it was necessary for the visitor to have the book of tickets with him each day, and to register for each event at the time of receiving the book. In this way those in charge were able to keep track of the number to be expected at every moment.

Window trim suggestion by the Society for Electrical Development for its campaign "An Electrical Christmas"

Mirrors in your show window are a very effective device, but they should be placed with great care, or they will do more harm than good. The unprincipled public has an incurable tendency to use them for putting its hat straight, or seeing whether its shoes are run down at the heel. If you have mirrors in your window, arrange them so that they reflect your stock and not the street. It is all very well to be accommodating, but window displays have a purpose. Do not defeat the purpose by tempting the public to regard them merely as inconvenient obstructions to a handy mirror.

Plans for building a canal running parallel to the Rhine River from Huningen to Strasbourg, a distance of about 80 miles, have been perfected by the French Government. The canal would be built and operated in such a manner as to permit the construction of ten hydro-electric stations with a total capacity of seven million horsepower.

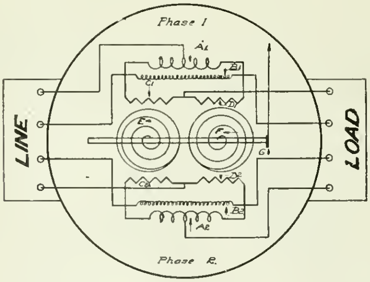
Hon. Mr. Burton, minister of railways, South Africa, in the course of a talk at Johannesburg, announced a comprehensive scheme of railway electrification throughout the country.

Lincoln Meter Co. of Canada Manufacturing Meter for Peak Load Registration

It was nine years ago that Mr. Paul M. Lincoln, of Pittsburgh, conceived the idea that a demand wattmeter, based on the heat principle, was worthy of investigation. Experiments were commenced at that time and have been carried on ever since with a persistency characteristic of the scientific research student. As a result patents were issued in Canada in 1915 and 1916. A number of meters, in their complete form, were also built up in 1916, and have been under test in various parts of the continent. For a period of three years they have given consistent and satisfactory results. Incidentally, approximately $52,000 has been spent during this experimental period, which gives some idea of the scope and thoroughness of the investigations necessary to produce a meter in its completed state. Finally, in October, 1918, the Lincoln Meter Company, Limited, was formed for the manufacture of the Lincoln Demand Meter, with head office and factory at 245 College Street, Toronto.

In its present form, the Lincoln Demand Meter gives a peak load registration and does not belong to the family of integrating watt meters. It can, therefore, be used with any make of meter or added to present installations. The operation of the meter is based on the expansion of a bi-metallic strip which causes a pointer to move across the scale in true proportion to the watts supplied to the instrument. For simplicity of explanation, the modus operandi of a single-phase meter is given; the three-phase instrument differs only to the extent of employing a double set of coils and heaters.

The current coil, with a tap taken from its centre, is wound over the potential coil. The load current is taken into the meter by way of this middle tap. The remaining two ends of the current coil are connected to two heaters, which, in turn, are connected together with a tap taken therefrom, which forms the load side of the line wire.



A_1, A_2, current coil; B_1, B_2, potential coil; C_1, C_2, back heater; D_1, D_2, front heater; E, back bimetallic spring; F, front bimetallic spring

The two heaters are placed adjacent to two bi-metallic springs. These springs are wound in the form of heavy hair-springs, and are mounted on the spindle, one in a clock-wise and the other in an anti-clock-wise manner. Thus, when potential only is applied, the current coil becomes a closed secondary of a transformer in virtue of the two heaters being in series, but as soon as the load is applied, the load current is superimposed on the current due to the application of potential on the primary of this transformer; this results in the following formula:

$$(E+I)^2-(E-I)^2 = EI \times \text{Constant}^*$$

This results in the following mechanical action. When voltage only is applied the current passing through the heaters is the same. Therefore the heat action on each of the two bi-metallic springs is the same and, as they are mounted on the spindle opposing one another, no movement of the pointer takes place. By the application of the above formula, as soon as current is applied, a difference in the current flowing in the two heaters is set up in true proportion to the watts applied, resulting in one spring being heated to a greater degree than the other. This results in an unbalanced expansion, causing the pointer to rotate until the spring reaches a point of balance.

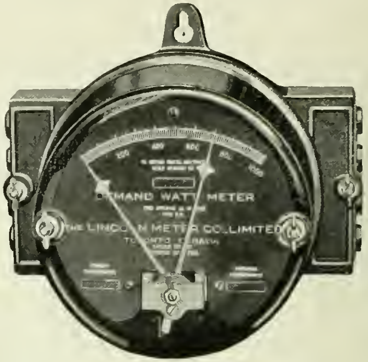


Fig. 2—The Lincoln Meter Complete

The utilization of two springs has another advantage, namely, it takes care of variations in external air temperatures; this change in air temperatures causes equal and opposite pressures from the bi-metallic springs with no resultant movement of the pointer. Temperature tests have been taken on the instruments and show on a range of from minus 10 degrees F. to plus 125 degrees F., an error of not more than 3 per cent., which bears favorable comparison with the average integrating watt meter.

Two pointers are provided, one being called the maximum pointer, remaining at the maximum load applied in any given period and the other giving the true logarithmic average for the immediately previous period.

The meters are at present built self-contained for 500, 200 and 100 voltages, 5 ampere capacity only. The principle of the meter being based on the logarithmic curve means that the nominal time period is of purely arbitrary definition. The meter that is now being built has been called a 10-minute time period, which means that the indication is 90 per cent. of the applied load at the end of 10 minutes, 99 per cent. at the end of 20 minutes, 99.9 at the end of 30 minutes, and so on, ad inf.

The Lincoln Demand Meter is essentially a Canadian product. In appearance and detail of manufacture, it is surpassed by no other high-grade electrical instrument on the market. Users of electrical appliances in Canada have, perhaps, been too much inclined in the past to make unfavorable comparisons of Canadian products with those produced in foreign countries. However, an intimate and critical examination of the Lincoln Meter will indicate that no effort has been spared to make it equal to anything that has ever been placed on the market. The tool equipment for the manufacture of the meter required much experiment and skill, and some seven thousand dollars have been spent in the design of the proper machine equipment for the production of the meter in quantity. The aim has been to get the best tools and jigs that money could buy, so that a high-grade article might be produced at a reasonable price. As the meter is 75 per cent. a press job, the tools are, for the most part, punches and dies of very accurate and, in some cases, extremely delicate design. Of the 146 parts entering into the composition of the instrument, the only parts that are not made in Canada are the glass covers, the winding of the potential coils, the hair spring for zero, and the raw material for the bi-metallic springs.

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*If we represent the current that passes through the combined resistance of C and D in Fig. 1, due to the presence of the voltage, by E, and the load current therein by I, the resultant current in one of these resistances is E + I and in the other E — I. The losses are proportional to the squares of these currents and the difference in these losses are proportional to the product EI cos ϕ. This holds true independent of power-factor or wave form: that is, the meter is a true wattmeter.

Accuracy is the prime requisite of this instrument and the factory processes are such as to ensure a high degree of accuracy in the assembly of the composite parts. The pairing of springs and heaters fundamentally determines the meter's accuracy, and in the Lincoln Meter Co's. factory, special means have been developed for co-relating springs and heaters that are absolutely accurate and simple withal. Another process in the manufacture of the meter that contributes to its final accuracy is the oil tempering of the bi-metallic springs. The springs are kept in an oil bath at a pre-determined temperature, which is maintained for several days with only a fraction of a per cent. variation, by electric thermostatic and time clock control. Even in the rougher operations, such as grinding of castings, it has been possible to work to a .002 inch limit. In testing the meters, they are calibrated against a master meter at full load and at zero, and are thus, of necessity, accurate at all other loads.

It is felt that the field for this instrument will be very considerable, because in Canada it has become almost general practice to have some form of charge which is presumed to be based on the demand. Such systems are installed capacity, floor area, ratable value, etc. Generally speaking, these systems have been adopted because of the lack of any instrument which can be obtained at anything like a reasonable price and which will give consistently reliable results. It is felt that this meter should be a profitable investment for a supply company on all loads of 5 kw. and over. At some future date when the production costs warrant, it is the object of the company to reduce the price to an absolute minimum, so that its use may become as nearly universal as possible.

Here is the Answer to All Your Troubles

One Hundred and Sixty-Two Items to Choose From—They are All Electric—If You're Looking for a Suitable Christmas Present, It's Here

FOR WIFE OR MOTHER

Any one of these electrical gifts will make her life easier and happier every day.

Coffee Urn
Cleaner
Desk Lamp
Disc Stove
Egg Boiler
Fan
Fireless Cooker
Floor Lamp
Grill Stove
Home Wired
Iron
Kitchen Motor
Percolator
Portable Sewing Machine
Range
Sauce Pan
Sew Motor
Table Lamp
Tea Pot
Toaster
Waffle Iron
Water Kettle
And many others

FOR HUSBAND OR FATHER

Some sensible, serviceable electrical presents which are sure to please

Auto Foot-Warmer
Auto Heated-Gloves
Auto Heated-Grips
Auto Horn
Auto Search Light
Auto Trouble Lamp
Battery Lantern
Cigar Lighter
Desk Lamp
Drink Mixer
Engine and Carburetor Heater
Fan
Flash Light Cane
Flash Light Umbrella
Hand Lamp
Illuminated Mirror
Immersion Heater
Radiator
Phonograph Motor
Portable Floor Lamp
Shaving Mirror
Shaving Mug
Writing Desk Lamp
And many others

FOR YOUNG WOMEN

Electrical gifts which young women will appreciate more than something "pretty" but impractical.

Boudoir Iron
Boudoir Lamp
Chafing Dish
Comb and Curling Iron
Corn Popper
Developing Lamp
Fan
Hair Dryer
Hair Singe
Massage Vibrator
Piano Lamp

FOR YOUNG MEN

Worth-while electrical gifts for young men which they will like because they are useful.

Alarm Clock
Bed Lamp
Desk Lamp
Developing Lamp
Fan
Flash Light Fountain Pen
Flash Light Pencil
Heating Blanket (for outdoor sleeping)
Scarf Pin (Electrically Lighted)
Shaving Mirror
Shaving Mug
Pocket Flash Light
And many others

FOR ELDERLY MEN

Electrical presents which will make the last years of their lives happier and brighter.

Bath Cabinet
Ceiling Clock
Cigar Lighrter
Fan
Hearing Device
Heating Blanket
Heat Pad
Immersion Heater
Radiator
Reading Lamp
And many others

FOR LITTLE BOYS

Modern toys for little boys which are educational as well as entertaining.

Bells and Buzzers
Bicycle Lamp
Boat
Dark Room Lantern
Engine
Experimental Set
Ferris Wheel
Flash Light
Picture Projector
Telegraph Set
Telephone Outfit
Toy Automobile
Toy Construction
Toy Motor
Toy Railway Outfit
Wireless Outfit
And many others

FOR ELDERLY WOMEN

Really practical electrical gifts for elderly women which will comfort and cheer them each day.

Foot Warmer
Hearing Device
Heating Blanket
Heat Pad
Illuminated Table Ornament
Medical Coil
Regulating Lamp or Socket
Tea Pot
Table Clock (Electrically Lighted)
Violet-Ray Apparatus (soothes, stimulates and invigorates)
Writing Desk Lamp
And many others

FOR LITTLE GIRLS

Presents which will educate and amuse.

Candelabra
Candle Battery Lamp
Christmas Tree
Lighting Outfit
Doll House (Electrically Lighted)
Electrical Toys
Toy Range
And many others

FOR THE HOME

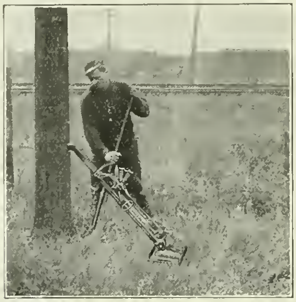
Practical electrical presents which will make the home a cleaner, more convenient and better place—lessening the labor and increasing the happiness of those who do the housework.

Air Heater
Alarms (Burglar and Fire)
Bread Mixer
Broiler
Casserole
Cereal Cooker
Chimes and Bells
Cleaner
Clocks
Coffee Mill
Combination Cooker
Convenient Outlets
Decorative Lamps
Disc Stove
Dish Washer
Door Bell
Dough Mixer
Egg Beater
Egg Cooker
Fans
Fireless Cooker
Floor Polisher
Floral Decorations
Food Chopper
Food Warmer
Frying Griddle
Heat Pad
Home Telephones
Hot Plate
Ice Cream Freezer
Illuminated Street Number
Iron
Ironing Machine
Kitchen Utility Motor
Knife Sharpener
Liquid Mixer
Modern Fixtures
Oven
Phonograph Motor
Plate Warmer
Player Piano
Radiators
Refrigerator
Silver Polisher
Thermostatic Furnace Control
Vegetable Slicer
Ventilating System
Waffle Iron
Washer
Water Heater
Water Purifier
Water Supply System

Suggestion for Contractor-Dealer Christmas announcement.

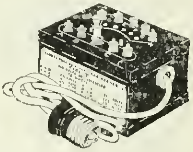
Pole Pulling and Straightening Jack

Templeton, Kenly & Company, Limited, 1020 South Central Avenue, Chicago, Ill., manufacture a jack called the No. 328 Simplex Pole Pulling and Pole Straightening Jack, which is built for the express purpose of pulling and straightening poles for telephone, telegraph, electric light, power and railway companies, municipalities and other public utilities having pole equipment. It is claimed that with this jack one or two men can pull the largest pole whatever the depth,, soil or season conditions, in a fraction of the time taken by the usual gang of five or six men, and also that one man, with this tool, can straighten a pole in much less time than it takes several men to do the same job in the ordinary way. The Simplex jack is constructed of the best materials, along rugged lines, and in its design the makers have endeavored to provide absolute safety to pole, overhead lines and operator. A similar jack to the Simplex No. 328 is the No. 310 Emergency Jack, which the company claim is adapted to an almost unlimited range of general utility service, as its many attachments enable it to be applied to almost every object that needs to be pushed or lifted.



Christmas Toys

The Masco Company have a fine selection of Christmas toy equipment in their Lionel line. The toy trains are a particularly complete selection—everything required in the operation of a railway system; transformers, motor and locomotive parts, current reducers, semaphores, lamp posts and lamps, switches, tunnels, station houses, straight and curved tracks, cars and trucks—everything to delight the eye and the heart of the Canadian boy. There is no more attractive display for the Christmas window than one of these trains in actual operation. It will attract crowds—and customers—where the "still" window will fail. Added to this is the boys' extreme satisfaction in the ownership of one of these outfits. It is an all-the-year-round remembrance of the one best day in the year.



Nor should we forget that the electric train, unlike most mechanical toys, is a source of continual knowledge. The boy learns as he plays, and continues to learn as long as he plays.

Current News and Notes

Bowmanville, Ont.

The Hydro Radial by-law for $216,030 has been passed by the ratepayers of Bowmanville, Ont.

Brantford, Ont.

A Dominion charter has been granted to the Robbins & Myers Company of Canada, Limited, Brantford, Ont.

Bridgeburg, Ont.

The Reliance Fuse Company of Canada, Limited, Bridgeburg, Ont., have been granted a Dominion charter.

Brockville, Ont.

A meeting of municipal electrical representatives in Eastern Ontario will shortly meet in Brockville to form an Eastern Hydro-electric Association for the purpose of giving support to Sir Adam Beck's plans to secure full development on the St. Lawrence River.

Campbellford, Ont.

The Hydro-electric Power Commission of Ontario will commence work during 1920 on the development of 10,000 h.p. at Ranney's Falls, near Campbellford, Ont. Power from this plant will be supplied to Peterboro and surrounding territory.

Darlington Township, Ont.

On December 13th the ratepayers of Darlington Township will vote on the $429,680 Hydro Radial by-law.

Fort William, Ont.

Fire recently destroyed sixteen cars, the car barns and other equipment of the Fort William Electric Railway. There were twenty-three closed cars operated by the city, five of which were saved and two can be repaired. Several Port Arthur cars have been loaned and an almost normal service is being maintained, except in rush hours. The company have already commenced rebuilding the barns, and an attempt will be made to convert the open summer cars into closed cars, in addition to purchasing a number of second-hand cars from other cities in which they are available. The cause of the fire is apparently unknown.

Guelph, Ont.

Mr. W. H. Breithaupt, president of the Waterloo and Wellington Railway, of Kitchener, has submitted a proposal to connect Guelph and Kitchener with a line that will run through Bridgeport, Bloomingdale, New Germany and Marden, coming into Guelph over the Elora road line. The length of the road will be fifteen and a half miles, and the cost $280,000, bonds to be guaranteed by the two cities in equal amounts.

Halifax, N. S.

Work will start at once on an extension to the Halifax Tramway lines on Cogswell street between Gottingen and Quinpool road.

Hamilton, Ont.

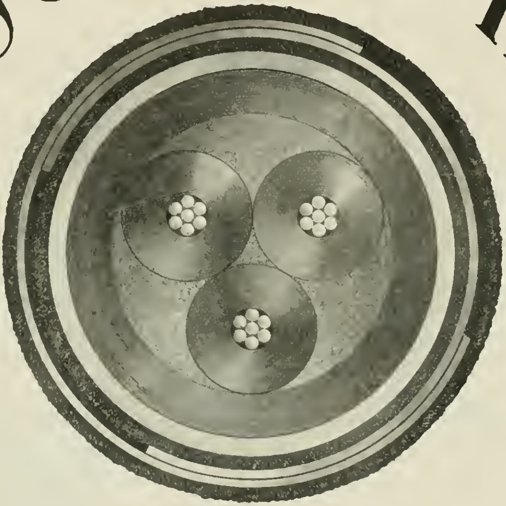
The ratepayers of Hamilton, Ont., will vote in January on the expenditure of $50,000 for an underground fire alarm system. A government order calls for all overhead wires in the central districts to be removed and placed underground within six months after the proclamation of peace, and it is necessary that this step be taken if the Dominion Power and Transmission Company and the Bell Telephone Company are forced to do likewise.

Hampton, N. B.

The ratepayers of Hampton, N. B., are endeavoring to have the town council proceed with the work of instal-

PHILLIPS'

ARMOURED CABLES



No. 2 B. & S. 3-Conductor 25,000 Volt Cable

Paper Insulated, Lead-covered, Double Steel Tape Armoured

Supplied to the Order of
The Quebec Railway, Light, Heat and Power Company

Eugene F. Phillips Electrical Works, Limited
MONTREAL

Branches: Toronto, Winnipeg, Regina, Calgary, Vancouver

ling an electric lighting plant to be completed some time during the coming year.

Lakefield, Ont.

The ratepayers of Lakefield, Ont., have passed a by-law authorizing the village council to enter into an agreement with the Hydro-electric Power Commission of Ontario. Power will be transmitted from the Auburn development at Peterboro.

Lake Temiskaming, Que.

M. J. O'Brien, Limited, Ottawa, Ont., contemplates the construction of a hydro-electric development on the Quinze River, near Lake Temiskaming, Que., to supply a pulp and paper mill which is also to be erected in 1920. Kerry & Chace, Limited, Toronto, are consulting engineers on the proposed work.

London, Ont.

The ratepayers of London, Ont., will vote at the January elections on the question of purchasing the London Street Railway.

The London & Port Stanley Railway Company have outlined the following work to be done in 1920 at the Port Stanley end of the line Ship dock, freight sheds, $2,500; steam heating system for depot, $4,500; extensions to sidings, $14,000; comfort station, $4,000; store room, $6,000; extensions to present buildings, $4,500; lockers, $1,500.

Work on the valuation of the properties of the London Street Railway Company is being carried forward by the Hydro-electric Power Commission of Ontario.

An electrical contracting business has been opened at 536 Elizabeth Street, London, Ont., by G. E. S. Pettett, who was for four years overseas with the C. E. F.

The Electric Motor Repair Company have opened premises at 349 Talbot Street, London, Ont., for the repairing of motors and the electrical equipment of automobiles.

Montreal, Que.

The Quebec "Gazette" announces the incorporation of the Ideal Washing Machine Company, Limited, with a capital stock of $25,000. The head office is at Montreal.

The Electric Machinery Company, Limited, Montreal, has been granted a Dominion charter.

New Liskeard, Ont.

A report states that electrification of the Temiskaming and Northern Ontario Railway has been considered at a cost of between five and six million dollars.

Oshawa, Ont.

The Hydro Radial by-law has been passed by the ratepayers of Oshawa, Ont.; amount, $771,894.

Ottawa, Ont.

The G. N. W. and C. P. R. telegraph companies have applied to the Government for an increase of approximately 20 per cent. in rates. Both companies claim to be operating under heavy deficits and that relief within the next year is absolutely necessary.

Pickering Township, Ont.

The ratepayers of Pickering Township have passed the $482,050 Hydro Radial By-law.

Port Arthur, Ont.

The Great Lakes Paper Company, Limited, a new industry in Port Arthur, have signed a contract with the Hydro-electric Power Commission for a supply of 16,000 horsepower at $17.50 per h.p delivered. This power will be generated at the new plant on the Nipigon River, some 65 miles from Port Arthur and transmitted at 110,000 volts.

Preston, Ont.

A meeting of the electors of the town of Preston was held on November 24, at which Sir Adam Beck and Chief Engineer Gaby of the Ontario Hydro Commission were the speakers. Their subject was the proposed Hydro radial between Elmira and Hamilton.

Scarboro Township, Ont.

The ratepayers of Scarboro Township passed the Hydro Radial By-law on November 22, the amount of which was $892,686.

Smiths Falls, Ont.

For many years the water supply of the town of Smiths Falls has been furnished by a steam pumping plant. The installation of three electric pumps, however, now enables the town to dispense with the steam plant entirely. Two of these pumps will be in continuous operation, while the third will be used as a booster in case of fire. The old steam pump will be kept in order to take care of any unexpected emergency.

St. Louis de Champlain, Que.

Work has started on the installation of an electric lighting system at St. Louis de Champlain, Quebec. Power will be supplied by the North Shore Power Company.

Toronto, Ont.

The Canadian General Electric Company recently announced their intention of placing an additional million dollars of capital stock on the market.

A newspaper report states that a scheme is under way to develop power at Indian Chutes, on the Montreal River, a short distance north of Elk Lake, where there is said to be an amount of between 4,000 and 5,000 horsepower available.

The Board of Control, Toronto, have recommended that a by-law be submitted to the ratepayers at the January elections on the question of authorizing an agreement with the Hydro-electric Power Commission of Ontario for the construction of a radial railway between Toronto and Bowmanville. Toronto's share of the proposed expenditure of $8,360,794 is $4,328,665. The proposed route will cover a mileage of 43.5 and the estimated capital cost is made up as follows: Right-of-way, grading, track and overhead, $6,510,794; rolling stock, car barns, etc., $1,830,000. It is estimated that the annual revenue will be approximately $1,118,003, made up of $873,140 from passenger traffic, and $244,863 from freight. The operating expenses are estimated at $1,076,175. The balance of the capital cost is to be borne in the following proportions: York Township, $381,587; Scarboro Township, $892,686; Pickering Township, $482,050; Whitby Township, $277,955; East Whitby Township, $299,943; Carlington Township, $429,680; Town of Whitby, $277,955; Town of Oshawa, $711,894; Town of Bowmanville, $216,030.

Tenders will be called by the Department of Works, Toronto, shortly, for new electric pumps at the main waterworks pumping station.

Windsor, Ont.

It is reported that the electrical contracting firm of Hutzel and Buehler, incorporated under the laws of New York State, will open Canadian connections with an office at Windsor, Ont.

Winnipeg, Man.

Work has been completed on the city of Winnipeg's new line to the Scotland Avenue station in Fort Rouge. This is one of the links in the new trnasmission line between Winnipeg and Portage la Prairie, the construction of which will proceed throughout the winter.

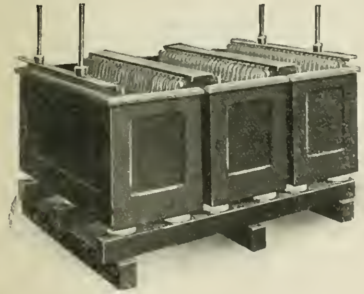
The establishment of a wireless telephone system throughout the settlements in Northern Manitoba, at an estimated cost of from $25,000 to $30,000, will be recommended by Professor R. G. Wallace, Commissioner for this territory.

CANADIAN PORCELAIN CO.

LIMITED

HAMILTON - CANADA

Manufacturers of High and Low Tension Porcelain Insulators



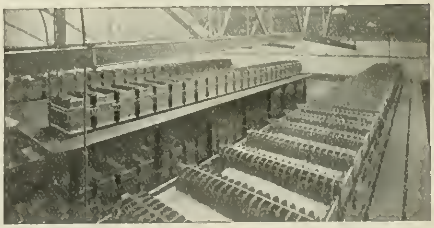
"HART" Storage Batteries

are made in CANADA for all classes of Service, such as—

Central Station (light and power).
Central Station (switching service).
Farm lighting, Isolated Plant lighting.
Fire alarm systems, railway signal systems.
Telephone and bell signal systems.
Electrically driven vehicles.
Automobile starting, lighting and ignition.

BUY
A
CANADIAN
MADE
PRODUCT

Help make CANADA'S dollar worth one hundred cents in foreign countries.



The Canadian Hart Accumulator Company, Limited

Sales Office:
619--511 St. Catherine St. West,
Montreal, Que.

Works—St. Johns, Que.

Winnipeg Office:
701 Merchants Bank Building,
Main Street.

Condensed Department

Publisher's Notice

Advertisements under "Situation Wanted or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at $2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

WANTED. Engineer familiar with Transformer Design. Must be technical graduate. State age and experience. Apply Box 79, Electrical News, Toronto. 23-2

WANTED—A man for testing and inspecting Transformers.

PACKARD ELECTRIC CO., LIMITED,
23-1 St. Catharines, Ont.

A CANADIAN, UNIVERSITY SCIENCE GRADUATE (married), wishes to change position for personal reasons. Has had valuable experience in selling, buying, construction, engineering and factory management. At present is manager of a manufacturing business which has shown decided improvement under his direction. Confidential correspondence solicited. Box 62, Electrical News, Toronto. 23

Wanted

Complete Turbo Generator, 2300 volts, 3 phase, 60 cycle, approximately 5000 kilowatt. Also 1000 kilowatt Railway Motor Generator Set, 2300 volt, 3 phase, 60 cycle, and 550 volt D.C. Box 61, Electrical News, Toronto. 23

For Sale

689 lbs. 300,000 C.M. D.B. weatherproof wire. 350 ft. 300,000 C.M.D.B.R.C. stranded wire. Immediate shipment.

Southern Canada Power Company, Limited,
330 Coristine Bldg.,
23 Montreal, Que.

Transformers

We now have a well-equipped shop for the repair of service transformers up to 50 K.W. capacity.

This is our specialty and we have had considerable experience along these lines.

Instead of discarding burned-out transformers, send them to us for expert repairs. We are prompt and can give satisfaction.

E. J. GROVES,
20-t.f. Box 422, Parry Sound, Ont.

For Sale

Wagner 3 H.P. Motor, single-phase, 60 cycles, 110 volts, complete with 2200-110 volt transformer, both in good condition. For further particulars write E. J. Groves, Parry Sound, Ont. 22-23

WANTED

Experienced Travelling Salesman

WANTED — Experienced Travelling Salesman by established Electrical Supply House. Address
"SALESMAN,"
Box 40, Electrical News,
Toronto

stating age and experience.

20-t.f.

MOTORS

We have the following New and Second Hand Motors ready for immediate shipment:

USED MOTORS

						Price
9—Canadian Westinghouse	30 H.P.,	860 R.P.M.,	3 phase,	60 cycle,	550 volt	$460.00
4— " "	30 "	" "	"	"	440 "	460.00
8—Crocker-Wheeler	30 "	" "	"	"	" "	460.00
2—Allis Chalmers	30 "	900 "	"	"	" "	460.00
1—Canadian General	30 "	" "	"	"	" "	460.00
4—Canadian Westinghouse	50 "	860 "	"	"	" "	552.00
9—Crocker-Wheeler	50 "	900 "	"	"	550 "	552.00
3— " "	50 "	" "	"	"	440 "	552.00
1—Canadian General	50 "	" "	"	"	" "	552.00
1—A. C. B.	50 "	" "	"	"	" "	552.00
1—Fairbanks-Morse	50 "	" "	"	"	" "	508.00
1 Canadian General	40 "	865 "	"	"	2200 "	550.00

NEW MOTORS

4—Crocker-Wheeler	30 H.P.,	900 R.P.M.,	3 phase,	60 cycle,	440 volt	$584.00
1—Canadian Westinghouse	50 "	" "	"	"	" "	700.00
2—Crocker-Wheeler	30 "	" "	"	"	550 "	584.00
1—Wagner	½ "	1800 "	1 "	"	110 "	80.00
4—Robbins & Myers	¼ "	" "	"	"	" "	35.00
1—7½ K.W., D.C., 110 volt Generator						$180.00
2—1 K.W., 2200 or 1100 to 220 or 110 volt Transformers						25.00
3—600 watt, 2000 or 1000 to 110 or 55 volt Transformers						15.00
100 Street Car Heaters, 110, 220 and 440 volts					Per 110 v. set	7.00

All Motors Guaranteed to be in first class running order complete with Oil Starter and Sliding Sub-base. Subject to prior sale. 22-23

ELECTRICAL REPAIR & SUPPLY CO., 71 Wellington St., SHERBROOKE, Que.

Cozy Glows Are Silent Salesmen

Mr. D. M. Mackie, Commercial Engineer of the Springfield Light, Heat and Power Company utilizes the cheery heat of the Westinghouse Cozy Glow Radiator in an effective manner in his electric shop, which is in connection with the offices of the company.

A Cozy Glow on a nearby table is permanently connected and its heat is so directed as to strike the faces of the customers as they pass by to pay their light bills. Their attention is thus forcibly directed to the Cozy Glow in operation, and to the attractive display of other heating appliances grouped about it on the table.—Contact.

City of Saskatoon

Sale of 750 K.W. Generator Set

The City of Sskatoon invites offers for the purchase of the following electrical machinery:—

One 26" x 48" x 30" Roll Armstrong Vertical Cross Compound Engine, direct connected to 750 k.w. General Electric, 2 phase, 2300 volt, 60 cycle Generator, complete with surface condenser, air pump, etc.

This unit is being offered for sale in order to provide room for a larger set, is in first class running condition, and can be shown in operation at the City Power Plant.

Tenders to be delivered to the undersigned on or before 12 noon on Friday, the 12th day of December, 1919.

C. J. YORATH,
23 City Commissioner.

PETRIE'S LIST

of NEW and USED

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
1	100	3	25	550	480	Westg.
1	60	3	25	550	750	Cr.-Wh.
1	50	3	25	550	720	Westg.
2	52	3	25	550	720	Lancashire
1	40	3	25	550	750	Cr.-Wh.
1	40	3	25	550	725	Harland
2	35	3	25	550	720	Westg.
1	30	3	25	550	1500	Tor. & Ham.
1	30	3	25	550	720	Westg.
1	30	2	60	220	720	F.-M.
1	25	2	60	220	945	Westg.
2	15	3	25	550	1400	Lancashire
1	11	3	25	550	715	Can. Union
1	10	3	25	550	1400	Lancashire
1	10	3	25	550	720	J. & M.
1	7½	3	25	550	1500	Lang.-Dav.
1	5½	3	25	550	1425	Amal. Elec.
1	5	3	25	550	1400	Excelsior
3	4	3	25	550	1400	Excelsior
1	3	3	25	550	1400	Excelsior
1	1	1	60	220	1750	Wagner
1	1	3	60	550	1700	Westg.
1	½	3	25	550	1400	R. & M.

Write Us for Prices

H. W. PETRIE, Limited
Front St. West - Toronto, Ont.

Subscribe for the
ELECTRICAL NEWS
$2.00 per year

Accident Prevention and the Balance Sheet

Most operators of public utilities are very anxious to make a good showing as to the earnings of their properties, and properly so. Money paid for repairs to machinery, inefficiency of man power, interruption of service and supplies consumed is reflected in the general cost of operation and the net gain or loss. What of the money paid out for the accidents? Can this be honestly charged against necessary operation? There are companies which do not have serious accidents, and it therefore must be logical to the companies which do have them that they can be prevented. The question is, how can this be done?

We will divide the accidents into two classes: the inevitable and the preventable. Inevitable accidents do not result from the neglect or carelessness of any one and the loss ocasioned thereby, which is very small, must naturally be charged up as part of the cost of production. Preventable accidents are caused by some one and constitute a large percentage of all accidents. While it is necesary for financial reasons to charge preventible accidents to operation, they should properly be charged against the superintendent, foreman or other employees who caused them.

As we have all heard many times, there are two sides to an accident when it occurs, first the humanitarian,in which the employee is the one vitally interested, and then the financial, in which the employer must be vitally interested, for when a fatal or serious accident occurs, he must pay the cost to the man injured and also replace him with a new man whom it will take time to train.

Most companies have sufficient rules for the safe operation of their property, but the fault often lies in the enforcement of these rules. Before accident prevention work becomes successful, it must be dealt with as an operating and business proposition. It is too often a fact that large companies employ a safety engineer and expect him to eliminate the accidents on their property without any assistance or co-operation on the part of the management or employees. Under these conditions the safety work will fail, as would any other department in the company. Often the safety department is looked upon as a side issue, which can be carried on when there is nothing else to do.

There are two doors leading out of industry. One turns out the finished product ready for the market. The other will turn out either cripples and hopeless wrecks or strong, healthy and contented men. Which does your plant strive to do?—N.E.L.A. Bulletin.

A Wastepaper Box that Makes Cleaning Easier

In the course of a day every store becomes more or less littered up with waste paper, empty boxes and other waste material, a condition which, of course, requires prompt attention in order to keep the store clean and attractive.

An arrangement which has become of considerable value in speedily disposing of such accumulated litter consists of a trap door 10" x 12" in the floor near the wall. Directly beneath this trap door a piece of steel furnace pipe is attached to the floor and extends down to within four feet of the basement floor; immediately under this pipe is placed a fire-proof metal container into which the litter falls after being swept into the pipe leading from the trap door. The door used for this system is scarcely noticeable.—Contact.

Turning Kickers into Boosters

The slogan of the Urbana (Ill.) Light, Heat and Power Company is "Service." "This does not mean simply electric service," says John A. Glover, General Superintendent, "but means service in the larger sense. One important detail is the prompt handling of all complaints. Every complaint must be fully satisfied at once if it is possible. If it is not possible, the complaint is recorded in a complaint register where it cannot be overlooked. The general superintendent personally examines every complaint and writes the customer a letter telling him the result of the investigation.

"This courtesy is much appreciated by our customers and has resulted in an immense amount of goodwill."—Contact.

SALE OF

Military Stores, Etc.

Dry Goods, Hospital Furniture, Bedding, Hardware, Leather Goods, Junk, Etc.

SALES WILL BE MADE BY SEALED TENDERS

Persons desiring to tender are requested to register their names and addresses with the

Secretary of the War Purchasing Commission, Booth Bldg., Ottawa

stating the class of goods in which they are interested, whether new or second-hand or both.
Tender forms with full details of the goods and places at which samples may be seen, will be mailed when ready to those who have registered as requested above.

Special Terms to Hospitals, Etc.

Dominion, Provincial, and Municipal departments, hospitals, charitable, philanthropic, and similar institutions which are conducted for the benefit of the public and not for profit may purchase goods without tender at prices established by the War Purchasing Commission.

Returned Soldiers and Sailors and Widows and Dependents of Soldiers and Sailors killed in the War may obtain supplies, for their own personal use and not for re-sale, through the nearest branch of the Great War Veterans Association who will combine individual orders and forward to the War Purchasing Commission through the Dominion Command of the Great War Veterans Association. These services are rendered by the Great War Veterans Association to all parties in the classes named, whether members of the Great War Veterans Association or not.

All communications should be addressed to the Secretary, War Purchasing Commission, Booth Building, Ottawa, who will be glad to supply lists and further details to those interested.

Electrical Books—Special Prices

The following Books are Offered Subject to Previous Sale:

"American Electricians' Handbook, a reference book for practical electrical workers, by Terrell Croft. 712 pages, with over 900 illustrations. Published by McGraw-Hill Book Co. Price $4.00.

A Handbook on the Steam Engine, by Herman Haeder. Published in 1914 by Crosby, Lockwood & Son. 522 pages, illustrated. Price $2.00.

A Laboratory Manual of Alternating Currents, by John H. Morecroft, E.C. Published. in 1912 by Renouf Publishing Company. 248 pages, illustrated Price $1.50.

Baudot Printing Telegraph System, by H. W. Pendry. Published in 1913 by Whittaker & Company. 144 pages, illustrated. Price $2.50.

"Central Stations," by Terrell Croft, 1st edition published in 1917, by McGraw-Hill Book Co., Ins. 332 pages, illustrated. Price $2.50.

Direct-Acting Steam Pumps, by Frank F. Nickel. Published in 1915 by McGraw-Hill Book Company. 258 pages, illustrated. Price $2.50.

Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, just published by McGraw-Hill Co., Inc. 285 pages, illustrated. Price $2.50.

Dynamo-Electric Machinery, by Francis B. Crocker, E. M., Ph.D. Published in 1908 by American School of Correspondence. 236 pages, illustrated. Price 50c.

Electric Railway, by A. Morris Buck, M. E. Published in 1915 by McGraw-Hill Book Company, Inc. 390 pages, illustrated. Price $3.00.

Electric Railway Engineering, by C. Francis Harding, E. E. Second Edition. Published in 1916 by McGraw-Hill Book Company. 416 pages, illustrated. Price $3.00.

"Electric Traction," a treatise on the application of electric power to tramways and railways, by A. T. Dover. Published in 1917 by Whittaker & Co. 661 pages with 518 illustrations and five folding plates. Price $5.00.

Electrical Injuries, by C. A. Lauffer, M.D., published in 1912 by John Wiley & Sons. 77 pages. Price 50 cents.

Electric Power Transmission, Principles & Calculation, by Alfred Still. 2nd Edition, revised, enlarged and rewritten. Just published by McGraw-Hill Book Co., Inc. 407 pages, illustrated. Price $4.00.

Elementary Principles of Illumination and Artificial Lighting, by Arthur Blok, A.M.I.E.E. Published in 1914 by Scott, Greenwood & Son. 235 pages, illustrated. Price 75c.

Elementary Graphic Statics, by John T. Wight. Published in 1913 by Whittaker & Company. 226 pages, illustrated. Price 50c.

"Elements of Radiotelegraphy." by Ellery W. Stone. Recently published by D. Van Nostrand Company, 267 pages, 125 illustrations, 33 plates. Price $2.50.

Examples in Alternating-Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price $1.50.

Examples in Magnetism for Students of Physics and Engineering, by Prof. F. E. Austin, B. S. Published in 1916. Price $1.00.

First Aid in Case of Electrical Shock, by Dr. John Woodman. Published in 1908 by the New York Edison Company. Illustrated. Price 50 cents.

"Governors and the Governing of Prime Movers," by W. Trinks. Recently published by D. Van Nostrand Company. 236 pages, 140 illustrations. Price $3.50.

Handbook of Machine Shop Electricity, by C. E. Clewell. Published in 1916 by McGraw-Hill Book Company. 461 pages, illustrated. Price $3.00.

How to Make High-Pressure Transformers, by Professor F. E. Austin. Second edition, just published. 48 pages, illustrated, price 65c.

Induction Coils in Theory and Practice, by Prof. F. E. Austin. Published this year by the author. 61 pages, illustrated. Price- $1.00.

International Library of Technology, Vol. 11-B, on Electricity and Magnetism, Electrodynamics, Electrical Resistance and Capacity, The Magnetic Circuit, Electromagnetic Induction, Chemistry and Electro-Chemistry. Primary Batteries, Electrical Measurements, 585 pages, fully illustrated, half Morocco bound. Published by The International Textbook Co., 1905. Price $3.50.

International Library of Technology, Volume 14-C on Storage Batteries, Incandescent Lighting, Arc Lighting, Interior Wiring, Modern Electric Lighting Devices, Electric Signs, Electric Heating, 540 pages, fully illustrated, half morocco bound. Published by The International Textbook Co., 1905. Price $3.50.

"Powdered Coal as a Fuel," by C. F. Herington, recently published by D. VanNostrand Co. 211 pages with 84 illustrations. Price $3.00.

Practical Electric Illumination, by Terrell Croft, First edition, published by the McGraw-Hill Book Co. 225 pages, illustrated. Price $2.00.

Principles of Direct Current Machines, by Alexander S. Langsdorf, M. M. E. Published in 1915 by McGraw-Hill Book Company. 404 pages, illustrated. Price $3.00.

Principles of Alternating Current Machinery, by Ralph R Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price $4.50.

Principles of Electrical Design—D.C. and A.C. Generators, by Alfred Still. Published in 1916 by McGraw-Hill Book Co. 365 pages, illustrated. Price $3.00.

Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price $2.00.

"Radio Communication, Theory and Methods, with an appendix on Transmission over Wires," by John Mills. First edition, just published by McGraw-Hill Book Co., Inc. 205 pages illustrated. Price $1.75.

Radiation, Light and Illuminatiun, by Steinmetz. Published in 1909 by McGraw-Hill Book Company. 304 pages, illustrated. Price $2.00.

Standard Wiring, 1919 Edition, 25th Year. The National Authority on Wiring and Construction. By H. C. Cushing, Jr. Leather cover, pocket size. Price $1.50 postpaid.

Steam Turbines, by Kennedy. Published in 1910 by Whittaker & Company. 100 pages, illustrated. Price $1.00.

Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Just published, by Longmans-Green & Co. 102 pages. Price $1.00.

Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price $2.00.

Test Methods of Steam Power Plants—A Reference Book for the Use of Power Station Engineers, Superintendents and Chemists, by Edward H. Tenney, B.A. M.E. Published in 1915 by D. Van Nostrand Company. 224 pages, 85 illustrations. Price $2.50.

The Electrical Contractor; Principles of Cost-Keeping and Estimating, by Louis W. Moxey, Jr. Published in 1916 by McGraw-Hill Book Company. 86 pages, illustrated. Price $1.50.

The Dynamo (2 volumes), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price $4.00.

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The School of Practical Electricity (Electrician's Course in 2 volumes). Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price $4.50.

The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 50c.

Transmission Line Crossings, by Frank F. Fowle. Published in 1909 by D. Van Nostrand Company. 69 pages, illustrated. Price 75c.

Wray's Manual of Car Lighting. Published in 1915 by Wray Publishing Company. 340 pages, illustrated. Price $1.25.

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Vol. 28 **Toronto, December 15, 1919** **No. 24**

Something New in Rates—Any Member of Family May Use Weekly Dollar Pass

In order to provide cheap carfare for its regular patrons, and at the same time induce a more general use of the street cars, the electric railway company of Racine is now selling a weekly pass, good from early Monday morning until the next Sunday midnight—a full seven days. Every conductor has passes for sale. The pass costs $1 and is transferable, so that any member of the family can use it. It is good on any street car, at any time of the week, for as many rides as you care to take. All you have to do is to show it to the conductor when entering the car, no need to make changes, pay fares or ask for a transfer.

This company is the first on the continent we believe, to try out this experiment. It believes that the universal use of passes would speed up service by eliminating delays where a large number of people get on the cars and have to wait while someone ahead hunts for change. The plan does away with all question about validity of transfer or tickets in cases where the time of day is involved; it means comfort and efficiency; by removing congestion at the car entrance it reduces chance of accidents and mistakes; by reducing the work of conductors, it leaves them free to watch out for the safety and comfort of passengers. In introducing this innovation to the public, the company made the following statement:

There is hardly a family in Racine which does not spend more than $1.00 a week for street car fare.

By using a pass, you will save money if members of your family ride on an average of three times a day. If the husband rides to work and back, and the wife rides down town and back each day on a pass, the average cost per ride would be hardly more than 3½ cents. It would mean 28 rides for $1.00.

But, in addition to that, you have the privilege of riding as often as you wish. When it is raining it is often desirable to ride only a block or two; with a pass this costs nothing. The pass will take someone to the theatre in the evening, and to an outing on Saturday or Sunday. By riding to the store to shop, instead of telephoning, the housewife can buy more economically.

Besides the financial saving, the use of the pass does away with the necessity of fumbling for change, asking for transfers, or getting onto cars at transfer points if you prefer to get on somewhere else.

B. C. Technical Association Urging Improvement in Status and Salary of Engineers

The British Columbia Technical Association held its usual monthly general meeting on the 17th November, in the Board of Trade rooms, Vancouver. Satisfactory reports were made on various phases of the Association's activities, and new plans for future action were outlined. The association has taken an active part in endeavoring to improve the status and salary grading of technical men in the Dominion Civil Service, and for several months past has been in constant correspondence with the authorities at Ottawa regarding the matter. Similar action has also been taken with regard to the regrading taking place under the Provincial Civil Service Commission. The committee report at the meeting indicated that while the Provincial Civil Service Association was given an opportunity of conferring through a committee with the regrading authorities, the committee chosen did not contain a representative of the technical men in the service. So while the Civil Service Association might perform valuable functions for the general clerical branches of the service, it appeared that in this instance the interests of the technical men were not being adequately presented. A delegation was appointed which left for Victoria the following day to interview the Civil Service Commissioner on the matter.

A discussion took place on the hitherto inadequate part which engineers and other technical men have taken in public matters, resulting in it being left to non-technical men to occupy public positions, which vested them with control over expenditure of money on engineering and other technical work. A Public Service committee was formed with instructions to work to promote and encourage increased interest among technical men in municipal provincial, and Dominion government affairs.

Industrial Democracy—Every Man a Capitalist

According to ex-President Taft of the United States, who has made a personal study of the conditions surrounding the coal miners' strike, there is, as usual, something of blame on both sides. He cannot agree entirely with the attitude of the employers, while on the other hand the workmen seem to have been seeking a share of "all the profits they had ever heard of," or some such expression. The one undisputable fact seems to stand out, however, that there is need for a little "give and take" on both sides—and the same is true of almost every industrial dispute. The only way to attain any real results seems to be for each side to place its prejudices and bitter feelings in the background for the time being and consent to take part in an open, frank discussion of the whole situation.

Perhaps the one thing that employers forget oftenest is that every human being resents being made into a machine. He longs for an opportunity to assert his individuality, however insignificant a thing that may be. Hence the big moral effect of giving the employee some voice, however small, in the management of the business with which he is connected. He is now a capitalist—before, he was only capitalized.

We are printing in this issue the first section of a description of an aparently very effective scheme of this "industrial democracy"—this giving the employee a voice in the shaping of his own destinies. In this case the results gained rest largely with the employees. Greater production means bigger earnings for all. Further than that the employees, as a group, profit or suffer together. If there is incompetence, or laxity, on the part of any one individual the loss is distributed. This tends to make every employee desirous not only of doing all he can himself, but of seeing that all fellow employees do the same. The indirect value of the system, therefore, is greater than the direct effect, and it follows automatically.

High costs of living doubtless have a big influence on the present labor situation; also the constantly recurring desire for more pay, but the cause at the root of unrest, if we don't misread the times, is that men want recognition as individuals, want more responsibilty. To simply do his duty according to some one else's estimate of that term no longer satisfies the human mind. He is still anxious to do his duty, but he asks that he have a hand in laying out the plan.

Effective Work of "Adequate Outlets Committee"

At a conference, held in Chicago last month, of the "Adequate Outlets Committee" of the National Electric Light Association, it was recommended that electrical manufacturers and others, in showing their electrical devices through printed advertisements, should illustrate them as connected with proper base outlets rather than attached to lighting fixtures as in the past. The idea of course is to educate the public. As long as advertisements show electrical appliances attached to lighting fixtures, just so long will the public believe that that is the most approved way to use them. The picture of an appliance attached to a wall plug will naturally have the opposite effect, namely, it will train the householder into thinking that if he wants electrical appliances he must equip his home with base outlets. It will follow then that the householder will demand these things of his architect when he is building or from his contractor when he is having his house re-wired or having additions made to his wiring equipment.

This is a move in the right direction and the whole electrical industry should take cognizance of the fact. Dealers should be particularly careful that the illustrations in their advertisements are properly designed.

Use Wired-Wireless on Transmission Lines

The Canadian Independent Telephone Association held their fourteenth annual convention in the Carls-Rite Hotel, Toronto, recently. Among the items on the programme was an address by Mr. F. E. Webster of the Noisy River Telephone Co., who urged that advantage be taken of the recent invention, known as "Wired Wireless," by which it was possible to utilize any metal circuit for the transmission of a number of voice messages. It was suggested that the network of hydro transmission lines which cover the Province could be utilized for this invention by the Independent Telephone Companies thus providing them with long distance connection—a feature so much needed to make them independent of the competing Bell system. Mr. William J. Herdman of the Canadian Machine Telephone Co., Toronto, dealt at some length with the technical side of this question.

The Legislative Committee of the association was authorized to continue the fight to have long distance connections provided over the Bell Telephone System at the regular rates for such service and without extra charge for connection to the local system.

The officers elected for the following year were: Honorary president, F. S. Scott, Brussels, Morris and Grey Municipal Telephone System, Brussels, Ont.; president, Myron A. Gee, Erie Telephone Company, Selkirk, Ont.; vice-president, A. MacLean, Bruce Municipal Telephone System, Paisly; secretary, A. Hoover, Green River; treasurer, F. D. MacKay, Canadian Machine Telephone Co., Toronto.

Court Frowns on Monopoly at Sorel

Mr. Justice Bruneau, in a recent judgment rendered in the Superior Court at Sorel, criticized a commercial coalition which he said had evidently been formed by certain tradesmen of that town for the purpose of raising prices unreasonably, and in a manner opposed to the public good. In the instance decided one hundred per cent. profit was admittedly charged alike for goods supplied and work executed. The court cut down the profit to thirty per cent.

Napoleon Latraverse engaged J. Octavien Peloquin to make certain electric lighting installations in his hotel. No price was agreed upon, and when the work was concluded Peloquin sent in a bill for $325.82. Latraverse considered the charge was exaggerated and engaged three qualified men to make an estimate of a fair value of the work. They concluded that $185.08 would be reasonable payment, and Latraverse thereupon offered to pay Peloquin $200 in full settlement of his account. The offer was refused and Peloquin took action in the Superior Court to recover $325.82 from Latraverse.

Mr. Justice Bruneau, in deciding the issue, made a detailed examination of the account, which was made up of a charge of $209.52 for materials supplied and $116.30 for labor. Defendant, His Lordship said, admitted that these sums included profits of one hundred per cent. under both heads, and the evidence revealed that the time charged for was exaggerated as well as the price. The work was executed in 1918 during which year the Judge said plaintiff had done business amounting to $20,000.

The price he had charged in this instance was, according to the proof, the current rate at Sorel, which, it was said, had been fixed according to a convention between three electrical contractors in Sorel. This convention, Justice Bruneau said, constituted a monopoly. It was an act which annulled all competition, increased the price of certain things and enabled the parties to the agreement to enrich themselves at the expense of the public. While merchants were allowed to organize for the protection of their common interests, it was conditionally upon the public interests not being unjustly affected by unreasonable profits.

"An understanding such as that which intervened between the plaintiff and the other electrical contractors of Sorel," said Justice Bruneau, "is contrary to liberty of commerce, work and industry, as tending to give them prices higher than what free competition would give."

In the circumstances established by the evidence, the Judge said that plaintiff ought to have been satisfied with the offer of $200 which defendant made to him in full payment for the work done and materials supplied. Judge Bruneau concluded by placing the value of the plaintiff's work at $152.01, to which the court would add thirty per cent., which the Judge considered was a fair profit. This made a total of $197.61, and at thirty per cent. profit would give plaintiff an income of $6,000.

Christmas Greeting with Peace & Plenty for the New Year

Editor and Staff of the Electrical News

Electric Spot and Fusion Welding

A Detailed Resume of the Progress and the Present Status of This Valuable Commercial Art—Illustrations of Various Types of Joints (Continued)

By F. Keith D'Alton*

The tests of a weld are rather interesting, since from the appearance of the surface of the metal in a cross section of the weld it is impossible to judge whether the added metal is pure or is full of oxides. The tests consist in hammering and bending sample welds and, in addition, by corrosion, using an etching fluid which will readily attack any oxides present. In performing the corrosion test, the metal is filed and polished to a high finish, and then an etching fluid, consisting of a solution of iodine and potassium iodide in water is applied. This first attacks the oxides, causing pitting, and thereby enabling the observer to determine quickly whether such an impurity is present in too great proportions.

In welding by any process there are two extremes which must be avoided; one is "overlap," Fig. 9, and the other is excessive "penetration," Fig. 10. If our electrode material (metallic) has a low melting point in comparison with that of the metal itself, we get "overlap" and small penetration. On the other hand if our electrode material has too high a melting point, overlap will be absent and deep penetration will result. In just the same way, Fig. 11, too high a current will produce too much penetration and possibly unnecessary stresses, whereas low arc current gives poor penetration, much overlap and a tendency for the electrode to "freeze" to the metal.

The required diameter of the electrode must be carefully determined, since too large an electrode gives an unstable arc and decreases the rate of deposition, while too small an electrode deposits metal rapidly, even before the metal, has been properly liquefied, causing overheating, softening of the electrode and overlap of the added metal on the original material. In welding, heating should be localized to avoid undue disturbance of the structure of the surrounding original metal. For a good weld, Fig. 12, it is necessary to have good diffusion of the fused metal into the work, without excessive stresses or any abrupt line of division. Penetration may be judged roughly by the depth of the arc crater, Fig. 13, but this method can be used only when the welding has been carefully done, as an interruption of the arc while welding will cause a deep crater to be formed, due to the shrinkage of the metal on cooling. To secure good penetration a short arc should be used and the arc travel should be slow. The difficulty of maintaining a steady arc is increased greatly by the presence of strong air currents. It is preferable, therefore, to use a booth to prevent rapid air movement, and also to protect other workmen from the effects of the brilliant rays of the arc. The inside of the booth is usually painted a dull black to prevent arc reflection.

Electric Arc Welding Equnpment

In a previous paragraph it was stated that both direct and alternating currents were used for arc welding. Although the accessories are the same which ever current supply we use, the chief piece of equipment for alternating current welding is a single phase high reactance transformer, while the equipment for direct current consists of a carefully designed generator and a more or less elaborate control system. The alternating current equipment at present used has a maximum current capacity of 200 amperes in the secondary circuit, while the direct current apparatus is built in capacities ranging from 200 amperes to 1,000 amperes, or higher. The reason for this is that the alternating current process is more suitable for welding where 200 amperes is the largest current required, while the direct current system is used for cutting as well, and it is frequently desirable to use a much higher current than for welding.

Direct current systems are of two kinds, namely "Constant Potential" and "Constant Energy." In the constant potential system, a compound-wound generator, driven by any capable source available, is used to supply the current. This machine is designed to deliver current at a constant potential of 60 volts, but since the voltage required at the arc ranges from 20 volts, for the metallic electrode, to 40 volts for the carbon electrode, a ballast resistance must be inserted in the circuit to cut down the voltage. This ballast resistance gives desirable voltage variations at the arc, but the energy spent in such a resistance is entirely wasted. In cases where several operators are drawing current from the same machine, however, there is no other satisfactory scheme. Branch circuits are run from the main panel to auxiliary panels, each of which supplies an individual operator. On the main panel is placed a main circuit breaker, a contactor, a relay and a dial switch, by means of which the ballast resistance in circuit is set at such a value that the current for welding is kept within desired limits. The operator first sets the dial switch in the position which in his estimation gives the most suitable current for the work he is about to do. He then strikes the arc. If the current drawn be too great, or the electrode freezes to the material being welded, the relay trips out the contactor, then draws it in again and this contactor keeps on functioning until the operator interrupts the arc. It is a signal to him that adjustments are not right. Fig. 14 shows the wiring of the main and auxiliary panels. Each auxiliary panel contains the same controlling equipment as the main panel with the

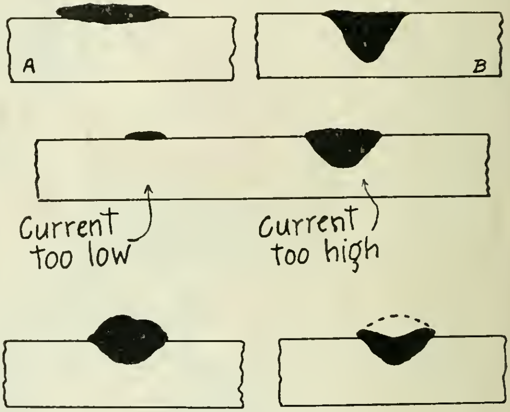

Fig. 9 (Upper left)—Excessive overlap.
Fig. 10 (Upper right)—Excessive penetration.
Fig. 11 (Middle)—Current extremes.
Fig. 12 (Lower left)—Normal weld.
Fig. 13 (Lower right)—Interrupted arc.

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*Before Toronto Branch A.I.E.E., Nov. 21.

exception of the main circuit breaker, generator field rheostat, field switch and instruments which it is not necessary to duplicate.

For single operator systems, the ballast resistance scheme may be used, but research and experiment have enabled most manufacturers to introduce improvements chiefly in generator design, whereby the machine takes care of voltage variations and the ballast resistance is unnecessary. The efficiency of the equipment is thereby increased and the control much simplified. I will attempt to describe in a more or less general way the manner in which these automatically regulated variable voltage generators operate. The designer endeavors to obtain a voltage current characteristic with voltage increasing as current decreases, so that through a given range of operation the output of the generator will be constant. Such a characteristic curve is dotted on Fig. 15. The result is the "constant energy" generator, which is used as a source of supply for the "constant energy" system.

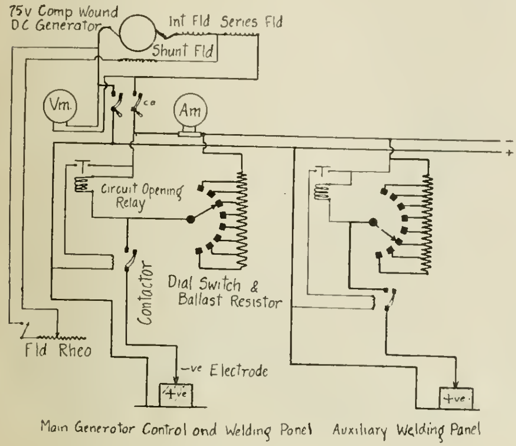

Fig. 14—Wiring of main and auxiliary panels

If the reader be fairly familiar with the characteristics of separately excited, shunt, and cumulatively compound wound generators, Fig. 15, he may readily see that a separately excited machine with an additional series field winding; if connected so as to oppose the flux caused by the separate excitation of the main poles, will have characteristics approaching those desired. A machine, operating on this principle was placed on the market several years ago, and has given exceedingly satisfactory results. The excitation is obtained from a small self-excited generator mounted on the main generator shaft, having its field controlled by a suitable rheostat. A generator of this type gives a practically constant output over a limited range of current variation, Fig. 15, Curve A. In order to make the machine equally suitable for higher current values, an adjustable shunt is placed across the series winding. Adjustment of this shunt changes the strength of the series field coils in their differential action on the main field. The shunt is adjusted by means of a switch on the control panel and the operator sets this switch in the desired position before striking the arc. Relays and contactors are not necessary as the dropping voltage characteristic makes it practically impossible to injure the machine by overload. On a short circuit the current does not exceed 120 per cent. of the operating value.

In order to obtain a similar characteristic and at the same time dispense with the exciter, one manufacturer has placed on the market a self-excited machine of quite unique design. The generator consists of a two pole armature in a frame with four poles of equal cross section and located symmetrically. (A theoretical winding diagram is shown in Fig. 16) The two diametrically placed poles, horizontally, contain only shunt windings, and will be referred to as shunt wound poles. The diametrically opposite poles, vertically, each contain a similar shunt winding and, in addition a differentially connected series winding with taps brought out to the control panel for varying the number of effective turns. At no load two adjacent poles (say left and upper) are of the same polarity and strength, the other two poles are of equal strength, but opposite in polarity. In this way the component voltages induced in the armature coils by the two successive poles (left and top) are additive, and the machine is so designed that, at no load, each component is 30 volts—giving 60 volts at the brushes.

As load increases the differential windings on the poles diametrically opposite, vertically, have more and more effect in reducing the strength of these two poles and thereby reducing the component voltage caused by these poles. This does not affect the two shunt poles, which remain constant, keeping their voltage component in the armature steady at 30 volts. A third brush is used, being placed midway between the main brushes. By means of this brush, the constant 30 volt component is used for excitation in the shunt windings. As the current increases and the variable component of voltage is reduced, voltage between the main brushes is also reduced.

If the current keeps on increasing, soon the series winding on the differentially compound wound poles neutralizes the effect of the shunt winding on those poles; the variable voltage component is then equal to zero and the terminal voltage will be equal to the constant component. Further increase in current will reverse these compound wound poles giving a negative variable component, thereby reducing the terminal voltage below 30 volts. By this means, the voltage drops as current increases (Curve B, Fig. 15), and we obtain a volt-ampere characteristic showing an approximately constant power output over a given range of current variations.

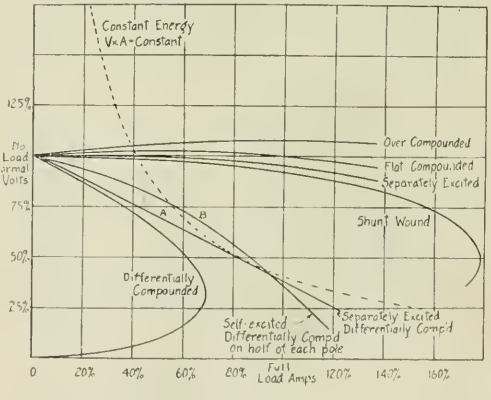

Fig. 15—Characteristics of various types of generators

The generator is designed to give 60 volts at no load, and to reduce this voltage to 20 volts when delivering full rated current. With a short circuit on this generator the current will not be excessive, so that the control is quite simple, consisting chiefly of a dial switch by which the operator selects the number of effective turns in the series field so that the desired voltage current characteristic is obtained. A volt meter, ammeter, and generator field switch, together with a main switch are also supplied on this panel. The volt-ampere curves, with different numbers of effective series turns are shown in Fig. 17. A machine of this design is now on the market. It is sufficiently rugged to withstand repeated and sudden variations of the load from no load to the short circuit value of current. Tests indicated that the machine does not require any external protection, having such inherent characteristics as will protect it under all service conditions. Two of these generators may be parallel, and they will operate satisfactorily, without an equalizer bus, giving larger currents. Each machine is provided with two interpoles placed between poles with similar polarity at no load. Commutation is sparkless, on the main brushes and very good on the third brush.

In comparing these two types of constant energy generators, it will be noted that, in principle, there is a great similarity. Each has a steady excitation and no adjustable differential series winding. Different methods are used for adjusting the effectiveness of the series winding, but the net result is practically the same. Consequently we expect somewhat similiar characteristics, and such we do obtain.

In addition to the constant energy generators, there is on the market a constant energy balancer set consisting of a cumulatively wound d.c. motor direct connected to a differentially wound generator. The two machines are connected in series across a 125 volt direct current power supply and the lines for the welding operation are taken from the generator terminals. This set is suitable for metallic electrode welding only. It is more efficient than the constant potential generator with ballast resistance and cheaper to install than the constant energy generator where the power supply is direct current. Its chief objectionable feature is that it cannot be used on other than a direct current supply.

Alternating Current Welding

Having discussed the features, difficulties encountered and overcome, and the characteristics of direct current welding, we will now consider the alternating current welding processes. These require an alternating current supply at any frequency from 12½ to 500 cycles, the higher frequences being better than the lower ones, as the arc is more stable.

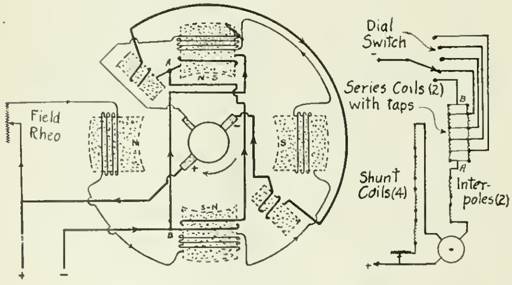

Fig. 16—A theoretical winding diagram

A special transformer, of high reactance, is used, thereby enabling the transformer to take care of short circuits and giving the desired dropping voltage characteristic. The transformer has several taps so that it may be connected to give currents suitable for the work being done. The whole equipment weighs only 300 to 350 lbs. and is readily portable. No control panel is used as such is not necessary.

The efficiency of one of these transformers ranges from 60 to 80 per cent. Each transformer is designed for use on one phase only, so that in any installation where several welders are being installed, they should be distributed on the different phases to equalize the load.

Alternating Current vs. Direct Current

We have mentioned that proper polarity is an important consideration; in welding with alternating current we cannot obtain this advantage gained by having the material the positive electrode. Hence for a given arc direct current welding is about 30 per cent. faster than alternating current welding.

The power-factor of the supply for an alternating current welding system varies between the limits of 12 per cent. and 52 per cent. and, consequently, is always low. The intermittent nature of the arc current has an objectionable effect on the lines, causing noticeable unsteadiness of voltage. With the direct current system the motive power may be of any sort. If it be an alternating current electric motor, the effect on the power-factor or steadiness of the supply will be no more objectionable than for any other motor of the same characteristics carrying a similar load. Great skill is required to hold the alternating current arc steady, especially with bare electrodes. In a sense then, the alternating current system demands flux covered electrodes to do the best work, whereas the direct current system will produce good results with the bare electrodes. Interruption of an arc is liable to cause oxidation in the crater. This, combined with the fact that the overall efficiency of the alternating current equipment is low, makes it a more costly process.

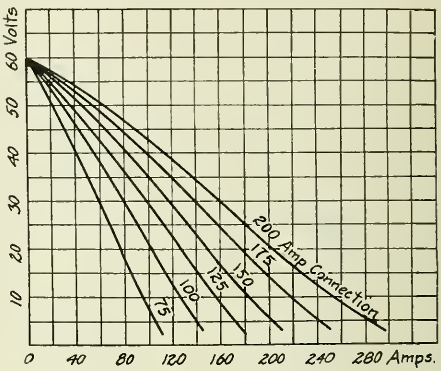

Fig. 17—Volt-ampere curves with different numbers of effective series turns.

The alternating current system does not permit the use of carbon electrodes, and in general the metal in the weld is more porous with alternating current, especially if the frequency be below 60 cycles. The alternating current system cannot be successfully used for cutting.

On the other hand, the alternating current equipment has the advantage of being lighter in weight, and lower in initial cost.

Direct Current vs. Gas

Gas welding is preferable for thin material, whereas arc welding is best suited for the depositing of large amounts of material. In welding on large plates direct current welding produces results equal to gas welding and is cheaper.

The advantages of arc welding over gas welding may be summed up in the following:

(a) Cheapest method except for thin material.
(b) No danger from explosions.
(c) Results are more reliable.

(d) The gas tanks have to be transported back and forth; no similar procedure is necessary with electric welding.

On the other hand—

(e) The gas flame does not emit dangerous rays of light and does not give the very intense brightness.

(f) The gas flame makes a very much neater cut than the electric arc process, on plates of all thicknesses cut.

Comparing the oxy-acetylene and direct current arc processes for cutting plates, the cost is the same up to about 1½ in. thickness. Gradually the cost of cutting by the gas process becomes greater than by the electric arc, until at 6 in. thickness, the former is about 60 per cent. greater than the latter. It is to be understood that this relation will vary somewhat with the type of work, and the skill of the operator. In welding it is found that at about ⅛ in. thickness the gas process costs are equal to the costs when the arc process is used. As the thickness of the metal increases the gas process suffers by comparison, and from ¼ to ½ in. the costs by gas are approximately double that where the arc is used. In general then, the gas process is more costly than the direct current arc process, except for thin material.

Protection

The electric arc with iron as one or both electrodes emits ultra violet rays which are injurious to the eyesight and also to the body of an operator. As a protection to the eye, a face mask is used which has in it a window through which the operator may observe the action of the arc. This window is fitted with colored glasses, usually two red and one green glass, which stop all ultra violet rays from reaching the eye. On the front of the window is a piece of clear glass which serves to prevent sparks or flying particles from cracking the colored glass. With the oxy-acetylene welding, only a clear glass is necessary to give protection to the eye against flying pieces of metal.

To protect the body, all that is necessary is to have a pair of leather gloves on the hands and tighly woven clothing on the body. In some cases the operator prefers to use a leather apron.

Care must be taken to avoid reflection of these injurious rays, since it is possible for the rays thus to reach a part which was thought to be protected and the effect may be equally serious.

Experiences in Industrial Democracy

Description of Successful Application of an Interesting Internal Government Arrangement in a Large Manufacturing Plant

By F. L. Fluerbach*

No doubt the most important topic in the mind and on the tongue of every business man to-day, not only in this great country of ours, but all over practically the entire world, is the existing unrest and unfortunate strife between capital and labor. Many of our best thinkers are deeply interested in the solution of this serious problem, feeling that this tide of discontent in its mad rush toward Bolshevism must be stemmed before it reaches the point where it will do a good deal more harm to all mankind than the bloody world-conflict just ended. The various systems under consideration, some old and some new, such as Shop Committees Plan, Employees' Representation Plan, Industrial Relationship and Industrial Democracy, may differ slightly or essentially in their application to practical business, but they all aim toward a better understanding toward representation in industry, which is the problem of the hour with business owners and executives, as well as the workers.

The plan of representation Wm. Demuth & Co. adopted at their factory in Richmond Hill, Long Island, in April, 1917, is that known as Industrial Democracy, introduced by John Leitch, whom most of you probably know as the author of the very interesting book, "Man to Man," which deals with this very important subject, and gives a very detailed and comprehensive description of industrial democracy.

What is "Industrial Democracy".

To have Industrial Democracy is to have some internal plan of government in each industrial plant, whereby the employees may have a direct voice in the formulating of such policies as directly affect their physical, moral, social, and economic welfare, as well as that of their families. This means length of hours, character of work, physical surroundings under which they work, the moral influences that surround them, the freedom of self expression, and the question of wages or some form of profit and loss sharing. All of these things vitally affect the employee and his family. Therefore, he must have a voice in their control, if we are to have Industrial Democracy.

Ethically it means a square deal in wages and working conditions. What a square deal in wages means, no living man can definitely describe. Some people consider the living wage as such—if we suppose that this expression can be defined, but under present conditions, and perhaps all future conditions, it appears a certainty that labor will not consider that minimum as a fair wage, nor is there in my mind any justifiable economic or ethical theory which makes it so.

Labor will continue to demand with even greater solidarity and persistence, collective bargaining with regard to wages, hours, working conditions, and all those matters which mutually affect employers and employees, and upon which selfish interests are bound to conflict from time to time. Whatever may be decided, and temporarily accepted as a fair wage and just working conditions will not stay decided, or really be decided, unless worked out in joint man to man conference between representatives of the two sides. This, in short, is the essence of Industrial Democracy—an organization and a spirit in which all concerned shall have effective voice in matters which concern all.

Not a "Class" Issue

The labor problem is much more than a class issue. It has steadily risen to the consciousness of mankind from economics to politics, from politics to ethics, and from ethics to a world issue involving the very safety and sanctity of governments and societies.

Better relations between employers and employees can best be arrived at by granting to the latter a greater share in the consideration of matters with which they are concerned and about which their entire life and existence centre to a great extent.

Labor and capital are meant to be partners, not enemies. Their interests are common interests, not opposed, and neither can attain the fullest measure of success and prosperity at the expense of the other, but only in company and by co-operation with the other. In an accomplishment of this sort the proper relationship of the money-supplying and money-receiving forces would naturally involve industrial peace, which cannot be secured by any conciliation or arbitration scheme thus far practised or tried out.

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*Factory Manager, Wm. Demuth & Co., Richmond Hill, N.Y., before recent congress of the National Safety Council.

Such schemes settle disputes, or at least try to settle them, only after they have arisen. Industrial democracy means to settle disputes before they arise and by aiming to reduce to a minimum the development and intensity of hostile attitudes and putting in their place mutual understanding and the effective good-will to co-operate. The full benefits of co-operation cannot be realized unless there exists a spirit of friendliness among those who have come together to work for the common good of all. Not much can be accomplished with a man who persists in believing himself always right, for to him it is the whole human race that's wrong. Co-operation means that individually-cherished ideas must at times be shattered and give way to the will of the majority.

Autocracy Must Go

In the past, the employer, generally speaking, regarded the laboring man simply as a necessary means to the productive process, whom he would buy as cheaply as possible, just as he would make his purchases for materials, endeavoring to make as much profit as possible out of both. Fortunately this attitude is undergoing a decided modification, but on the part of a certain type of employer it is still altogether too prevalent. Two influences are bringing about this rapid change in attitude.

In the first place, employers are discerning more clearly the meaning of loyalty, and now can see that this spirit cannot be obtained through the old autocratic attitude. They are beginning to realize that the growth of their business depends upon the growth of the people in their organization, and that loyalty, like electricity, works only when there is a return circuit.

The big man to-day realizes that up to the present time hands only have been employed, and regrets that he did not see years ago that all the humans in his place had not only hands, but also heads containing brains, capable of adding intelligence to their work, which means a larger quantity and better quality of merchandise. He realizes that he cannot get the activity and co-operation of these brains unless he first assures these people of a square deal, and, therefore, takes a new atitude that co-operation is far better than competition between employer and employee, and that fair dealing is the fundamental and basic principle on which relations between employers and employees should rest.

Waste of Human Resources

In these days of efficiency and economy, we all recognize—or will do so before very long—that the greatest waste in the world is the waste of our human resources, and it is quite natural that we start the big work of economy in our own organization.

Secondly, there is more general recognition of the fact that political democracy without a measure of industrial democracy or self government is somewhat hollow.

The fact that workingmen have been fighting in Europe to make the world safe for democracy helps to suggest the ideal of a better, more thorough and truer democracy at home, and it is generally conceded that the social and economic destinies of our country in the next few years depend largely upon the attitude of the employers toward industrial democracy within their respective establishments.

The workingman desires—yes, demands most emphatically in some cases—to be considered a human being, to have proper physical conditions surrounding his labor, to secure a sufficient return to give his family the right kind of a home and education.

Realizing the need of a better understanding between our employees and ourselves to stimulate an interest in their work and clear from our industrial pathway some of the difficulties which you all have faced from time to time, we installed, about two and a half years ago, a system of organization government, generally termed and known as industrial democracy.

Took Government as a Type

We took as example the United States Government, which having been established and carried on for more than 140 years, semed a pretty fair guide. We have a Cabinet, Senate, and House of Representatives. The Cabinet consists of the executive officers of the company, with Mr. Demuth as president of the company, acting as its chairman. This body is not elective, its personnel existing by virtue of position in the organization. It is primarily an executive body, and while it has the power to veto, the same has never been used, there being no occasion for it. It also has the power to initiate legislation, by making suggestions in a message to the Senate or House of Representatives, which, of course, may or may not be accepted.

The Cabinet meetings have before them the bills which have been passed by the Senate and the House, and also the minutes of all meetings and discussions, which give a very clear conception of what is in the minds of our people. The Cabinet deals with the larger and more intimate problems of management, which would naturally come before a meeting of executives. Any desired change affecting employees in the least manner is not framed as an order, but put in the form of a suggestion, stating the reason for same very frankly and clearly, and is sent to the Senate or House. No matter what its fate may be, it is sure of a full and complete discussion from every possible angle, and if the measure be rejected, the executives may rest assured that they have been prevented from issuing an erroneous order and saved from the results thereof.

The Senate also is an elective body. It is made up of about thirty foremen and heads of departments, who are in positions of authority over the workers themselves. It elects a president, vice-president, secretary, and sergeant-at-arms, and standing committees, and special committees as the occasion may demand. Its power and practices are identical with those of the House of Representatives.

One Representative for Each Thirty Workers

The House is the popular body of government, being elected by secret ballot by the whole body of workers. Each department has representation—thirty workers electing one representative, either man or girl. The representatives are supposed to act as counsellors within their departments, receive all complaints and suggestions from their fellow workers, and in turn acquaint them with the doings of the legislative bodies.

The Speaker of the House is elected, and he appoints committees, through whom business is transacted to a considerable degree. Each measure is generally referred to a committee to investigate and report, so that when the time comes for open discussion, all available facts will be at hand.

Meetings of the Senate and House are held weekly and always in the company's time, which we consider very necessary for the success of the undertaking. A set of by-laws has been devised for the use of both bodies by a joint committee, and all their business is transacted in accordance with same. Any question affecting working conditions, safety, sanitation, wages, piece-work rates, etc., is brought up before either of the three government bodies, and any recommendation decided upon after a careful discussion and deliberation is brought to the next body for their action. No change becomes a law until it has been approved by all three bodies. In that way we believe we have found a much better way of feeling the pulse of our people, in learning what they desire, and in avoiding difficulties rather than curing them, which is usually the case in the ordinary shop committee plan. We do not wait for the trouble to culminate—for the sickness to develop. The men hear the report and progress of their respective departments, learn about the troubles of another department, and are helping their fellow workers in getting over any difficulties that they may experience.

We can clearly see the actual formation of a threatening cloud. The open discussion of any dispute has never failed to avoid accumulation of such clouds and outbreak of storm.

The Adjustment of Wages

Permitting the men to have a say in adjusting their wages removes this perplexing question as a field of dispute. The fairness with which the members of the House have always considered and handled all questions of this sort has been most remarkable, and has come to us with a complete surprise. Our experience has shown us very plainly that people learn to be responsible by exercising responsibility; learn to participate in decisions by participating in discussions—even though the experience may at tmes seem costly to all concerned.

I will give one little example that will show very clearly how industrial democracy and the wage question work together. Last fall twenty-five men of one of our departments were somewhat influenced by an outsider who had formerly worked for us and was then working for a competitor. He advised them that this would be an opportune time to strike for more money. The matter was brought to my attention. I called the boys together and said to them: "If there is anything that is not satisfactory, bring it up in your House, through your representatives. That is the place to air all your troubles and bring your difficulties. The next day, I am glad to say, the representatives of that particular shop came to the House and presented their case. A committee was appointed to investigate the matter and report at the next meeting. The committee came back with quite a detailed report, after having gone to the office to obtain figures as to the rate of pay a year ago, six months ago, and three months ago, and having convinced themselves of the true facts, reported back to the House of Representatives:

"We do not favor any change of piece-work rates for this department, because we find that the men are absolutely unfair in their demands."

The House voted to accept this report, and the twenty-five men went back to work.

Qualifications for Representatives

Any man or woman is eligible for the position of representative, provided they have the following qualifications:

First.: They must be absolutely on the square, in order that their fellow employees may have undoubted confidence in their fairness and honesty, so that they may be entrusted with any and every mission which should be carried to the House.

Second: They must be able to speak and understand English, so that they may fully understand what is going on at the meetings and be able to report to their co-workers.

Third: They must have been in the employ of the company for at least one year. This gives us the assurance that the man who knows enough about the institution itself and about the work that he is fairly well qualified to take part in all discussions, by having some fundamental knowledge of the business as well as of his co-workers. This also excludes the possibility of having a labor agitator come into the place for a short time to have himself elected as representative.

We have a large sign hung up in our meeting room reading: "We come here not to convince or convict, but to understand," and while this served as a gentle reminder during the early stages of the game, it has become such a definite habit that this sign to-day is more ornamental than necessary.

(Concluded in next issue.)

Surtax on Public Utilities

The Administrative Commissioners of Montreal have adopted a by-law, which will have to be ratified by the council, imposing a realty tax and surtax on the property of the public utility companies. The realty tax is to be $1.35 per $100 of the value of the property, and the surtax is 5 per cent. on the property of the companies (other than water companies, which will pay 1 per cent.) situated on the streets, lanes and public places of the city and made use of for the operations of the companies. The Tramways Company is exempted from the surtax.

Flexible Rate of Fare

In a statement filed with the Federal Electric Railway Commission of the United States by the Committee of One Hundred of the United States Electric Railway Association the continuation of private ownership and protection of private capital invested is recommended. The committee further recommends the enactment of measures providing a flexible rate of fare based upon the cost of service, including a fair rate of return and a further reward based on efficiency in operation.

W. W. Freeman New President of The Society for Electrical Development

At a meeting of the Board of Directors of the Society for Electrical Development, held at the society's offices, in the Engineering Societies Building, New York City, on November 11th, Mr. W. W. Freeman was unanimously elected president of the organization, succeeding Mr. Henry L. Doherty, who has held that office since the founding of the society, nearly six years ago. As president of the Union Gas and Electric Company of Cincinnati, Mr. Freeman is well known to all branches of the electrical industry.

British Industries Fair

Admission to the British Industries Fair to be held at London, Birmingham and Glasgow in February next, is by invitation only. Canadian buyers who propose to visit the fair can obtain invitations from the British Trade Commissioners in Canada at Montreal Toronto and Winnipeg, respectively.

Extract from Mr. White's Paper

In our last issue we published an item under the heading "Some Interesting Data on Cost and Operation of Transmission Lines." By an oversight this was not credited to Mr. James White, Assistant to Chairman, Commission of Conservation. It was an extract from Mr. White's address before the Calgary Industrial Council.

Electric Railway Hazards—Causes, Effects and Remedies

By R. E. McDougall*

There is no business where there are so many possibilities for accidents as that of running an electric railway, nor any business where there may be so many different classes of injuries, both to employees and the public. Crisscrossing cities, towns and country as traction lines do, with the possibility of injury not only to employees and passengers but pedestrians and the general public as well, it is not surprising that traction men are interested in accident prevention—and not only interested to the extent of spending their money and time in this work, but are firm believers in the good that can be accomplished by education along safety lines.

Under the head of "Hazards" on electric railways we have three main classes of accident, viz:

1—Accidents to employees; 2—Accidents to passengers; 3—Accidents to pedestrians and others using streets and highways.

Accidents to Employees—Causes, Effects, and Remedies

Electric railway employees may be injured in many ways, such as: wagons; falls in our houses and repair shops; being run over by equipment; blood poisoning; being struck by falling objects, collisions between cars and vehicles; eye injuries from flying particles; falls from cars, falls into excavations, etc.

Investigation of accidents similar to above show a part of them are caused by defective equipment or conditions over which the employee has no control, but the most of them are chargeable either to carelessness on the part of the injured employee, his co-employee, or forman, or the failure to make and enforce safety rules.

An employees' accident record quickly demonstrates who is the careless and chance-taking man and this record will be of value in helping to make employees more careful. An employee known to be reckless or willing to take chances in regard to his own safety or that of a co-worker, is dangerous on any property. In the selection of employees some thought should be given to this phase of a man's character.

Very often failure by the injured employee or his foreman to give proper care and attention to slight injuries results seriously and is followed by infection and blood poisoning, and may be the cause of losing a limb and often a life. The old saw, "A stitch in time saves nine" certainly holds good in this connection. A small first aid kit with disinfectants and bandages should be produced and kept where easily accessible, and the foreman and men should be impressed with the necessity of giving minor injuries attention.

Sometimes it is the small things that lead to the most serious accidents. One of the most distressing cases of this kind that has come under my observation recently, was due to a car on the road with a faulty trolley retriever which could have been repaired in five minutes time. A line tower truck was standing near where the car in question had to pass; two men were on the tower and the wind swung the trolley rope so that it caught the top of tower, throwing the men to the pavement, badly injuring both and probably permanently injuring one; as a result, two men were laid up for months, one perhaps for life, with a cost to the company of several thousand dollars. I might recite a number of instances of this kind, but if you will give some attention to a study of the conditions which lead up to most of this kind of accidents, you will find it is the little things and careless acts that pave the way to bad accidents.

Accidents to Passengers—Cause, Effects, and Remedies

Traction managers and accident adjusters have found that the public believe it is the easiest thing possible to receive a serious injury on a street car; negligence lawyers are also active in propogating this idea. As a matter of fact, when you consider the number of passengers carried yearly by traction companies, with the possibility for accidents, the percentage killed or seriously injured is not nearly as high as in industrial plants.

There are of course, a great many ways by which passengers can be and are injured. Investigation shows the three most prominent causes to be:

a—Improper operation af car by employees; b—Run down condition of equipment, track, etc.; c—Carelessness on the part of injured person.

(a) Improper Operation

Improper operation of car of part of employee often causes: collisions and derailments; premature starting, thereby throwing passengers in cars, or while boarding and alighting; collision with other vehicles at street intersections; striking passengers who have alighted from cars going in opposite directions, etc.

We are all familiar with this type of operation and its results. The human element is the big factor in causing and preventing accidents. Motormen and conductors are as willing as the rest of us to do their share and the big thing is to secure their co operation. Here, in particular, the record of trainmen is of value. If it is found that a trainman is making an undesirable record for himself the use of an itemized record in pointing out the number of accidents he has been responsible for and what they are costing the company in dollars and cents, will be of great assistance in educating that particular employee. Personal education of each employee along accident prevention lines will prove a big investment for the traction company that is willing to spend the money to do it.

It can afford high class men to do this work properly, and find at the end of a number of years that its accidents have decreased in number and have cost less. This will be the only comparison of any value that can be made, for the reason that if an accident has not happened you cannot satisfy anyone that you have prevented it.

(b) Poor Condition of Track

A high standard of maintenance with reference to equipment, track, loading platforms and other portions of the property that the public come in contact with has much to do with preventing accidents. You do not have to be told that when your tracks are not in good shape you are going to have more derailments and collisions with cars; that when equipment does not work properly you are going to throw more people daily in and off the cars. Money spent on upkeep means less accidents and reduced expenditures.

Holes and depressions in the pavement or at points where cars stop to take on and off passengers are a very common cause of accidents, often serious. Co-operation between the municipality and the company will prevent many accidents of this nature and at a comparatively small cost.

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*Claims Agent, New York State Railways, Rochester, N.Y., before National Safety Council Convention.

A close watch of the conditions will save both much more money than the cost of proper upkeep.

Sometimes it pays to make conditions fool-proof. As an illustration: On the property I am connected with, for some years prior to 1913 every summer we had from five to ten cases of broken arms due to passengers, when windows were up, resting their arms on the window sill and projecting between the iron bars, which were about four inches apart on some of our equipment. The breaks were caused by coming in contact with other cars in curves, trees, sides of bridges, or other vehicles. It was costing us anywhere from two to five thousand dollars a year fighting these cases in court or adjusting the injured party's claims. In 1913 and 1914 at an expense of about four thousand dollars we added enough bars and screens to the sides of the cars so that it was impossible for a passenger to get his or her arm outside the car, and we have had but one accident of the kind since.

For years all the warnings of railway operators and the many examples of injuries due to getting on and off moving cars had no effect on the public; it was not until folding steps and doors came into common use that any reduction could be made of the class of accidents known as "Boarding and Alighting." The closing door and folding step are not necessary to the transportation of passengers, but today you cannot find a manager or operator who would say they are not worth much more than they cost in the money saved his company so far as accidents are concerned.

(c) Carelessness of Passengers

I believe I am safe in the assertion that one half of the accidents occurring to passengers on street cars are caused by the passenger's own carelessness or contributory negligence. They will get on or off a moving car if permitted, and invariably when doing so face the wrong way. Without looking they will step from a car directly in front of a moving auto or other vehicle. They will do a thousand and one things that are risky. Many women's shoes and skirts cause nasty falls resulting in broken bones or sprains and lay them up for weeks. Tight skirts and high heels cause more women to be thrown than the operation of the car. Passengers will jump off a car, cross directly behind it, and onto the track in front of a car going in the opposite direction without looking or paying the least attention to what they are doing.

Accidents to Pedestrians and Others—Cause, Effect and Remedies

Accidents in which the public (not including patrons) are involved come within the following classifications:

a—Pedestrians struck by cars; b—Pedestrians falling into excavations, over defective track, material left in street, hit by falling poles and wires; c—Occupants of vehicles in collision with cars.

(a) Struck by Cars

Many of the individuals struck by cars are children playing in streets and their injury is due to thoughtlessness more than anything else. They will chase a ball onto car tracks without a thought of a car; they will catch a ride on the rear of a wagon or truck and drop off in front of an approaching car; they will ride a sled or a bicycle down an incline across tracks, never giving a thought to the possibility of injury. Their elders also get hit for the same reason. They do not think, and rely on others to look out for their safety. Intoxication is quite a factor in this type of accident, particularly on interurban lines.

While the motormen at times are responsible for injuries to pedestrians, the majority of them are chargeable to the injured party. They could be avoided generally by the use of a little judgment or common sense. Some individuals will hurry to cross ahead of a car and then stop and watch it go by, they will step from the curb between two automobiles or pass behind one car directly into the side or in front of one going in the opposite direction.

(b) Falling Over Materials

Most accidents under this head are caused by employees leaving materials and excavations improperly guarded and lighted. Fortunately at the present time most municipalities have ordinances requiring proper guarding and lighting, and in the event of neglect or oversight on the part of employees their attention is soon called to it by the police.

(c) Collisions

The increase in the number of motor vehicles in the past few years has resulted in an enormous increase in accidents between them and electric railway cars, and a long list of killed and injured. The most serious occur at grade crossings familiar to the auto drivers and with every opportunity to see and know of the approaching car or train travelling at high speed. Early this summer in a three weeks period, fifteen people were killed in three accidents of this type, within a radius of fifty miles of Rochester. One car was being driven by a girl of seventeen who was learning to operate the machine, one was being driven by a boy of fourteen, and the third was driven by a man who could see an express train approaching him at right angles and deliberately tried to beat the train to the crossing. Notwithstanding the fact that you read of this kind of fatality in every paper you pick up, it seems to and will continue as long as high powered automobiles are permitted to be operated by irresponsible or reckless drivers. Signs, warnings or signals will not prevent these accidents occurring; the careful, prudent driver will not take such a chance.

In order to reduce the number of street accidents the main thing necessary is education—education that will teach everyone (be he employee, passenger, pedestrian or auto driver) what it is that leads to accidents and how they can be avoided; particularly education of the young child and the school boy and girl regarding the value of life and limb, the wastefulness of unnecessary haste and neglect; education of the men and women by the passing and strict enforcement of reasonable ordinances; and education of the drunken driver and persistent chance-taker by a straight jail sentence.

Canadian Cotton Adding Power Equipment

Mr. R. S. Kelsch, consulting engineer, Montreal, has drawn plans for an extension of the power plant of Canadian Cottons, Marysville, N. B. It is intended to instal a low pressure steam turbine of 500 kw.

Book Cases for Storage and Display

In a new electrical store recently opened by a N. S. contractor-dealer, the counter cases for fuses, flashlights and small stuff are not the ordinary shelves or show cases, but are regular built-up sectional book cases. The effect is very satisfactory and the goods are kept clean and at the same time within partial view of the customer.

The earnings of the Southern Canada Power Company continue to increase. For October, the gross increased by $8,222, and the net by $6,904, the total of the latter being $27,492. The industrial department of the company is very active in securing industries for the district served by the company, and during the last two months obtained six firms to locate there, mostly branches of large U. S. companies.

Canadian Electric Railways Association Holds Annual Convention in Montreal—Officers for 1920.

At the conclusion of the business meeting of the Canadian Electric Railways Association, which was in session at the Windsor Hotel Wednesday and Thursday, Dec. 3 and 4, the following were chosen executives for the ensuing year:

Hon. president, Col. J. E. Hutcheson, general manager Montreal Tramways Co.; hon. vice-president, Acton Burrows, Canadian Railway and Marine World, Toronto; president, A. Gaboury, superintendent Montreal Tramways Co.; vice-president, G. Gordon Gale, vice-president and general manager Hull Electric Railway; hon. secretary-treasurer, A. Eastman, vice-president and general manager Windsor, Essex & Lake Shore Rapid Railway Co.; executive committee: Geo. Kidd, general manager British Columbia Electric Co., Vancouver; A. W. McLimont, vice-president and general manager Winnipeg Electric Railway; M. W. Kirkwood, general manager Grand River Railway Co., Galt, Ont.; C. L. Wilson, assistant manager Toronto & York Radial Railway; F. D. Burpee, superintendent Ottawa Electric Railway; R. M. Read, superintendent Quebec Light, Heat & Power Co.; C. C. Curtis, manager Cape Breton Electric Railway, Sydney, C. B.; and Col. G. C. Royce, general manager Toronto Suburban Railway.

Col. J. E. Hutcheson

Mr. A. Gaboury

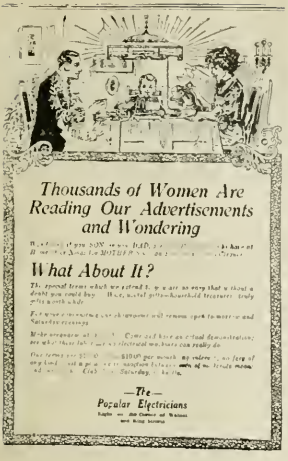
The honorary presidency went unanimously to Col. Hutcheson in virtue of his being among the pioneer electric street railway men in Canada, having been in active service in that work since 1891 and instrumental in its development before that date. Col. Hutcheson has been general manager of the Montreal Tramways Co. since 1912 and was formerly manager of the Ottawa system.

Mr. A. Gaboury, the new president, was vice-president in 1919. He is thoroughly versed in every phase of electric street railway operation, having started in 1894 as a motorman and risen through the various branches until his appointment as superintendent of the Montreal system 16 years ago, which position he still holds. For years he has also been prominently identified with the "Safety First" campaign.

Mr. Paul F. Sise Steps Up to Presidency of Northern Electric Company

Mr. Paul F. Sise,, formerly vice-president and general manager of the Northern Electric Company, Limited, has been elected president in succession to his brother, Mr. E. F. Sise, who recently tendered his resignation as chief executive of the organization in order to give his attention to other activities. After graduating at McGill in 1901, the new president took an apprenticeship course at the Pittsburg plant of the Westinghouse company, and was with the same company in New York from September 1902 to September 1903 when he returned to Canada and became connected with the Montreal Sales Department of the Canadian Westinghouse Company. In December 1904, Mr. Sise became secretary-treasurer of the Northern Electric and Manufacturing Company, Limited, and in 1910 was appointed managing director of that company. When the Northern Electric and Manufacturing Company was amalgamated with the Imperial Wire and Cable Company in 1914, Mr. Sise became vice-president and general manager of the new organization. In December 1915, Mr. Sise went overseas as Adjutant to the 148th Battalion, from Montreal, was later attached to the War Office in London and sent to the United States on the staff of the British Recruiting Mission, after which he served with the Canadian Forces in Siberia—returning home in May 1919.

Mr. Paul F. Sise



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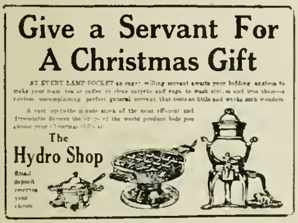

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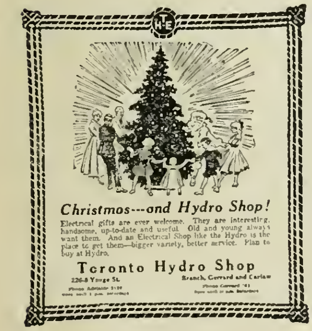

Christmas---and Hydro Shop!

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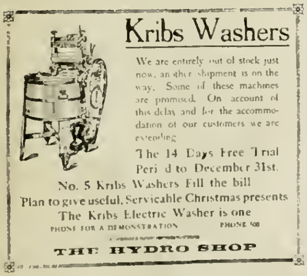

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We are entirely out of stock just now, another shipment is on the way. Some of these machines are promised. On account of this delay and for the accommodation of our customers we are extending

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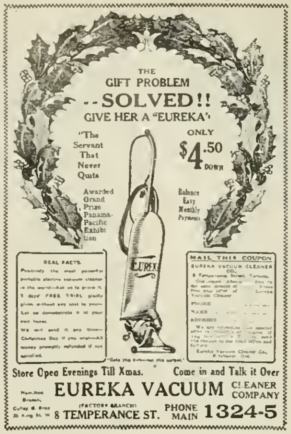
No. 5 Kribs Washers Fill the bill
Plan to give useful, Servicable Christmas presents
The Kribs Electric Washer is one

PHONE FOR A DEMONSTRATION PHONE 500

THE HYDRO SHOP



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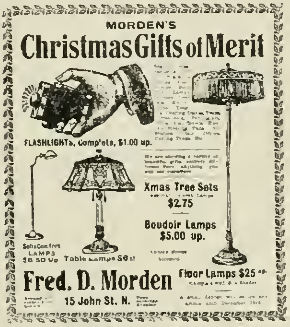
Balance Easy Monthly Payments

REAL FACTS
Positively the most powerful portable electric vacuum cleaner in the world—Ask us to prove it. 3 days' FREE TRIAL gladly given without any cost to you. Let us demonstrate it in your own home. We will send it any time—Christmas Day if you wish—All money promptly refunded if not satisfied.

MAIL THIS COUPON
EUREKA VACUUM CLEANER CO.
8 Temperance Street, Toronto.
PHONE
NAME
ADDRESS

Store Open Evenings Till Xmas. Come in and Talk it Over

EUREKA VACUUM CLEANER COMPANY
(FACTORY BRANCH) 8 TEMPERANCE ST. PHONE MAIN 1324-5



MORDEN'S
Christmas Gifts of Merit

FLASHLIGHTS, Complete, $1.00 up.

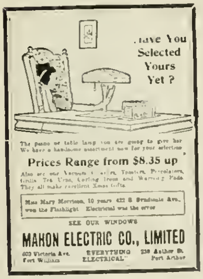
Xmas Tree Sets $2.75

Boudoir Lamps $5.00 up.

Table Lamps $6 up

Floor Lamps $25 up

Fred. D. Morden
15 John St. N.



Have You Selected Yours Yet?

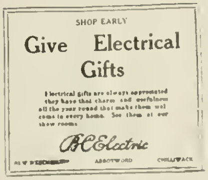
Prices Range from $8.35 up

Also see our Vacuum Cleaners, Toasters, Percolators, Grills, Tea Urns, Curling Irons and Warming Pads. They all make excellent Xmas Gifts.

Miss Mary Morrison, 10 years, 422 S. Syndicate Ave., won the Flashlight. Electrical was the error

SEE OUR WINDOWS

MAHON ELECTRIC CO., LIMITED
"EVERYTHING ELECTRICAL"
Fort William
Port Arthur



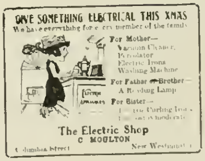
SHOP EARLY

Give Electrical Gifts

Electrical gifts are always appreciated; they have that charm and usefulness all the year round that make them welcome in every home. See them at our show rooms.

BC Electric

ABBOTSFORD CHILLIWACK



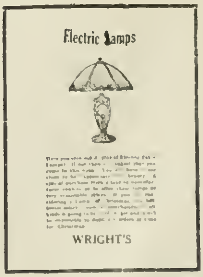
GIVE SOMETHING ELECTRICAL THIS XMAS

For Mother—
Vacuum Cleaner,
Percolator
Electric Irons
Washing Machine

For Father or Brother—
A Reading Lamp

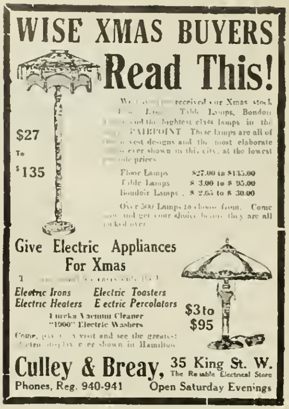
For Sister—

The Electric Shop
C. MOULTON
New Westminster



Electric Lamps

WRIGHT'S



WISE XMAS BUYERS
Read This!

$27 To $135

We have just received our Xmas stock of Floor Lamps, Table Lamps, Boudoir Lamps and the highest class lamps in the PAIRPOINT. These lamps are all of the newest designs and the most elaborate ever shown in this city, at the lowest possible prices.

Floor Lamps $27.00 to $135.00
Table Lamps $ 3.00 to $ 95.00
Boudoir Lamps $ 2.65 to $ 30.00

Over 500 Lamps to choose from. Come now and get your choice before they are all picked over.

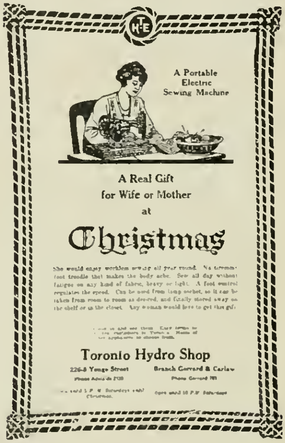
Give Electric Appliances For Xmas

Electric Irons
Electric Toasters
Electric Heaters
Electric Percolators
Eureka Vacuum Cleaner
"1900" Electric Washers

$3 to $95

Come, pay us a visit and see the greatest electric display ever shown in Hamilton.

Culley & Breay, 35 King St. W.
The Reliable Electrical Store
Phones, Reg. 940-941 Open Saturday Evenings

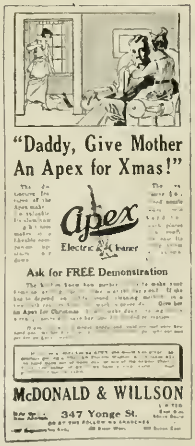


A Portable Electric Sewing Machine

A Real Gift for Wife or Mother at Christmas

She would enjoy workless sewing all year round. No tiresome foot treadle that makes the body ache. Sew all day without fatigue on any kind of fabric, heavy or light. A foot control regulates the speed. Can be used from lamp socket, so it can be taken from room to room as desired, and finally stored away on the shelf or in the closet. Any woman would love to get this gift.

Toronto Hydro Shop
226-8 Yonge Street
Branch Gerrard & Carlaw



"Daddy, Give Mother An Apex for Xmas!"

Apex Electric Cleaner

Ask for FREE Demonstration

McDONALD & WILLSON
347 Yonge St.

What Electric Dealers are doing to gather in the Christmas trade. Attractive newspaper announcements educate the public where and what to buy.

The Contractor-Dealer

Toronto Electrical Contractors Discuss the Financing of Time Sales—W. L. Goodwin Coming—Agreements with Employees—Open Price Plan Working Well

About thirty contractors gathered at the Hotel Mossop on Thursday evening, Dec. 4, for the regular monthly meeting of the Toronto Electrical Contractors Association. After an enjoyable dinner had been served the business of the evening was proceeded with. This was the first meeting held at the Hotel Mossop, and those present expressed themselves as well satisfied with the service. The next meeting will, therefore, be held at the same place.

President Kenneth A. McIntyre brought to the attention of the contractors certain suggestions that were made at the recent convention of the Ontario Municipal Electrical Association in regard to the appointment of local Hydro superintendents as assistant electrical inspectors, with power to order service connections, pending the visit of the regular inspector. Mr. McIntyre urged the manifest unfairness of such a procedure and mentioned that it had been opposed by several of the Hydro men at the convention. In order that the Toronto Electrical Contractors Association might be placed on record in connection with the matter, he had written Sir Adam Beck voicing support of the present inspection policy, under the Hydro-electric Inspection Department, and deprecating any change.

Mr. McIntyre read a letter from the secretary of the British Columbia Electrical Contractors' Association, enclosing a copy of the minutes of their meeting of Nov. 10, and requesting that the Toronto Electrical Contractors' Association exchange minutes with them in future. On motion of Mr. Harry Hicks, seconded by Mr. Davenport, it was agreed to do so.

Open Price Plan Discussed

There was some discussion on the operation of the Open Price plan. Mr. McIntyre pointed out that nineteen members of the association had taken advantage of the plan, up to a month ago, and from its inception up to that time, nearly 500 reports had been submitted. He described briefly how the plan worked and what it accomplished. There were some questions asked by those who had not participated up to the present time as to the possibility of the plan being used dishonestly. Mr. McIntyre answered that there was an opportunity for a crook to get away with sharp practice just once, but if he did not abide by his figure as submitted to the Open Price secretary and undercut his competitors, he was immediately shown up for what he was. Mr. Carthy suggested that there was the possibility of collusion between two contractors to obtain figures alternately and hand them over to each other. Mr. McIntyre said that crookedness could not altogether be prevented in any case, with or without the Open Price plan, but they had to go ahead on the supposition that their competitors were honest. There had, he said, been somewhat less enthusiasm in the plan latterly, and it had been decided that what was required was regular meetings. As a result the Board of Trade room, on the 19th floor of the Royal Bank building, had been engaged for the second and fourth Thursday of each month. The meetings opened at 11 a.m. and a 60 cent lunch was served, $2.00 being charged for the room. The members previously notified the secretary regarding items which they wished to have brought up.

In reply to an enquiry from Mr. McIntyre, most of those present who had not previously used the Open Price plan, declared their intention of doing so.

The President had a letter from the Hydro-electric Power Commission requesting that the association appoint a member on the Approval Committee of the Hydro, which passes on any new electrical devices submitted by the Hydro Laboratories as doubtful. It was moved by Mr. Hicks and seconded by Mr. Davenport that Mr. Geo. J. Beattie be asked to act on the committee.

Goodwin Coming to Toronto

Mr. McIntyre announced that Mr. Goodwin was coming to Toronto, in January, on the invitation of the manufacturers' and jobbers' associations, the Ontario Association of Municipal Electrical Engineers, the Toronto branch of the American Institute of Electrical Engineers, the Electrical Contractors' Association and the Electric Club of Toronto. All these organizations proposed to hold their conventions at the same time. Then tentative programme was that on the morning and afternoon of Thursday, Jan. 15, the electrical contractors, the manufacturers and the jobbers should have their meetings. On Thursday evening there would be a banquet of the Municipal Engineers' Association, which would be through about 8 o'clock, and it was probable that the Toronto Electrical Contractors would also have a meeting on Thursday night. The big feature would be a joint banquet of the entire industry on Friday evening, Jan. 17. Mr. Andrews had been authorized to act for the Manufacturers' and Jobbers' Association, and Mr. Clement for the Ontario Association of Municipal Electrical Engineers. It had been suggested that as The Electric Club of Toronto and the Toronto Branch of the American Institute of Electrical Engineers, were organizations with but a small annual fee and no great reserve of funds, the manufacturers and jobbers and the contractors should undertake the financial obligations in connection with Mr. Goodwin's visit and the joint meeting. On motion of Mr. Davenport, seconded by Mr. Clark, Mr. McIntyre was authorized to act for the Association and make any financial arrangements that might be necessary.

Standardization of Plugs and Receptacles

Mr. McIntyre brought to the attention of the meeting a communication from the Ontario Association of Municipal Electrical Engineers in regard to standard plugs and receptacles. At the Niagara Falls convention of that association Mr. Goodwin had emphasized the advantages of standardization, and Mr. McIntyre said it was a very important question. Wonderful advances had resulted in the lighting field when the Edison base had been made standard, and no doubt this would be the case in the appliance field also if similar steps were taken. The only opposition, as Mr. Goodwin pointed out, was from a few manufacturers who had selfish interests to serve. The Municipal Engineers had written, asking for suggestions from the other sections of the industry. On behalf of the Toronto contractors, Mr. McIntyre had replied suggesting that a preliminary committee be appointed composed of representatives of the various organizations of electrical men. This suggestion was to be considered by the Electrical Engineers at their January convention.

Agreements with Labor

The next item of business was in regard to the recommendations of the Joint Industrial Council of the Building Trades of Toronto in connection with the fixing of agreements between employers and labor. These recommendations were:

(1) That all agreements between employers and employees in the building trades be made to expire Dec. 31.

(2) That this method be put into operation at once and all agreements running into 1920 to continue, but new agreements to be made this year covering the balance of 1920 and to be operative at the expiration of the present old agreements.

(3) All negotiations to be started on or about Sept. 15 and to be completed on or before Nov. 15.

(4) In case of failure of the employers and employees to reach an agreement on or before Nov. 15, then the settlement will be automatically placed in the hands of a board of arbitration.

(5) The board of arbitration to consist of two members appointed by the building trades league and two by the associations of employers; these four to appoint a fifth, who will act as chairman of the board.

(6) The award of the said board of arbitration shall be binding on all parties to this agreement.

Mr. McIntyre pointed out that there were two points regarding which question might be raised—the date of the agreement, which was perhaps too far ahead of the opeinng of the season, and whether the award of the arbitration board should be absolutely final. As to the date, he pointed out that it was now too late to affect this year's agreement in any case.. Mr. Wood thought no agreement should start till about April 1, because the men would be getting dissatisfied again before the first of May. Mr. Drury, however, thought that they should let it stand for one year anyhow and then if it did not work out, change it. Mr. Carthy also believed that prompt action would be appreciated by the men and didn't see just what difference three months would make. Mr. McIntyre referred to the trouble that had been experienced with the men last summer and said that the nearer they came to the date, the less likelihood there would be of unrest. After some discussion it was decided to leave the matter in the hands of Mr. Kay, the association's representative on the Joint Industrial Council.

Financing Time Sales

Mr. McIntyre next introduced Mr. Annesly of the Commercial Credit Co., who was present to explain how the Company's service would assist dealers in financing time sales on electrical devices, such as vacuum cleaners, washing-machines and small electric motors, which are now so generally sold on a credit basis. The plan, briefly, is as follows:

The Commercial Credit Co. of Canada, Ltd., will advance up to 75 per cent. of the uncollected deferred payments, but in no case more than the original cost of the article to the dealer, for a period not exceeding twelve months. In the case of articles sold on time payments extended over more than 18 months, an amount equal to the total instalment due the dealer in the next twelve months will be paid down by the company, against the contracts on which above instalments are payable, provided the amount is not more than the cost of the articles to the dealer. At the end of twelve months, if the contracts still have some time to run, a further advance of an amount equal to the total of instalments due in the next twelve months, may be made.

A simple form of lien note is supplied by the company, which the customer signs at the time of the sale, and which is made out in triplicate, one copy for the purchaser, one for the dealer, and the original, which is to be assigned to the company. The company's name does not appear on the note; it is made out in favor of the dealer. Contract forms are also furnished, which contain the agreement between the dealer and the company. An instalment note form is attached to the contract.

When an advance is desired against a number of customers' notes, the dealer assigns them over to the company, attaches them to the contract form, which he fills in, making out the note for the amount required. On receipt of this collateral, the company's cheque is mailed to the dealer. The company does not take lien notes in amounts of less than $500.

Customers pay their instalments in the ordinary way to the dealer, and he pays off his note to the company in monthly payments from the customers' instalments received. The receipts from these customers' contracts each month will invariably be greater than the payments to the company.

A minimum down payment of 10 per cent. must be secured from the purchaser, and a limit of 18 months for deferred payments insisted upon, for articles on which the dealer wishes 75 per cent. advance. In the case of articles sold on longer terms than 18 months, the time given rests with the dealer; the shorter the time, the greater the advance he may obtain. As the company's advance is not made for more than 12 months, the dealer must receive from his contracts in this period an amount sufficient to retire his note.

The charge to the dealer is based on the actual amount of his obligation, the schedule being as follows: 12 months' contract, 9 per cent.; 11 months, 8½ per cent.; 10 months, 8 per cent.; 9 months, 7½ per cent.; 8 months, 7 per cent.; 7 months, 6½ per cent.; 6 months, 6 per cent.

The company does not do any collecting. If the dealer has not his name on the machine, his lien must be registered.

Mr. Beech, of the Northern Electric Co., and Mr. Haddie, with the Canadian General Electric Co., were present at the meeting, and after the discussion on the Commercial Credit Company's scheme, expressed their readiness to cooperate with the contractors in any way possible.

Catch the Rainy Day Customer

There are lots of innocent little "kinks" in the retail business that help you increase your volume of sales. One dealer, when it rains, sets an umbrella stand just outside the entrance door. A protecting canopy over the display window and doorway is a silent invitation to passers-by to step in out of the wet and examine the display. A window card with some such wording as "Step inside until the shower passes over" will lend further assistance.

The ratepayers of the border municipalities have voted in favor of the acquisition of the Sandwich, Windsor and Amherstburg Railway by the Hydro-electric Commission.

A vote will be submitted to the ratepayers of Windsor, Ont., at the January elections on the question of taking over the light and power plant of the Sandwich, Windsor and Amherstburg Railway Company.

The Waterloo, Ont., water and light commission have decided to install an additional seven transformers which will give them about double their present power capacity.

"Merchandising Ethics"

By Samuel Adams Chase

In almost all kinds of business which have the experience based on any long perspective, "hind sight" we may call it, the difference between the jobber and the retailer is clearly defined. Their boundaries are marked by so many danger signs that practically no one attempts to overstep them. Marshall Field & Company seem to be an exception but even with that firm and even before the death of Marshall Field, the wholesale and retail stores were separated by half a mile, geographically; and they sold to—and bought of—the retail and wholesale branches precisely as if there were no relation.

Jobbing is as definite a public need as any other division of business. The jobber is a financial necessity to the trade. He is an auxiliary reservoir of credits and supplies. He is the banker, the warehouse of the retailer. No one can take his place because no one is able to have or to get the special knowledge if the retailers needed to conduct the jobber's business. The manufacturer cannot do it successfully and when he tries to do it, usually he busts. He ought to.

Electrical Merchandising Lacks Perspective of Experience

Electricity is a new force and the sale of electric apparatus is newer. Therefore, it lacks the perspective of experience which almost all other kinds of business have the advantage of and are guided by in their mutual relations. It is not strange that men in a new business should try new methods; should overstep boundaries where no boundaries are known to exist. But that time,—that period of adolescence has very nearly passed. It is sufficiently clear now that the rules of the dry-goods trade, the boot and shoe trade, etc., apply with equal force to the electrical trade if I may so call it. The rules of the game are identical and they cannot be violated without inquiry. **Jobbers must have the retailers and when they attempt to do an over-the-counter business, they are starving out the source of their own prosperity.**

Go down through the wholesale dry-goods district and look at the sign in each window"**wholesale only,—no goods sold at retail.**" You do not need to be told that this is not a work of altruism on the part of the jobber. It is purely selfish. He knows that he will be boycotted off the street, if he attempts to do a retail business.

Is there any right or wrong about the matter? Apparently not, unless there is an implied obligation not to do certain things,—that is, for instance, selling at retail when you call yourself a dry-goods jobber. You have no such distinction to-day in the electric trade. Would it not be better, would it not sweep away a lot of cobwebs if you had?

These are not class distinctions; they are differences in function. When a customer buys a pair of shoes he buys the services of the jobber who warehouses them and carries the credits, or notes, of the retailer who, on his part, provides the store where the shoes are displayed and the attendant who displays them and makes the sale.

Merchandising Functions Cannot be Combined Effectively

These functions cannot be combined effectively. Always the attempt has led to disturbances and often to disasters. We North Americans like to make our own experiences without regard to that of others, so we pay for it. Everything that is worth anything costs about what it is worth. Experience ranks high in value, so if you persist in making your own, it will cost money.

Is it not a fact that when the jobber attempts to conduct a retail business he immediately increases the overhead, without realizing it, on his entire business, owing to expensive location, distance from shipping facilities and other causes; also disturbs trade conditions creating distrust and competition from retailers and other legitimate customers of the jobber?

Sir Walter Scott saw the publishers growing rich upon the sale of the books he was writing. "Why," he asked, "should I not have this money?" Why not? So he founded a publishing house of his own—and busted sky-high in a very short time. His last years were embittered by the struggle to pay the debts.

Every author knows this story. Mark Twain knew it. Nevertheless he wanted to hog the publishers' profits so he founded a publishing house —and busted sky-high in a very short time. H. H. Rogers came to his assistance, in which he was luckier than Scott, but most of the rest of his life was embittered by the struggle to pay his debts.

There are plenty of other comparisons to show the folly of trying to change the economic boundaries which have been fixed by a century or two of the experience of hundreds of thousands of successful merchants.

Honesty is the Best Policy

How can we hook up the term "honest" with the term "experience." At first sight they seem to have no relation to each other. Yet "honesty is the best policy." Honesty of course, is merely being "on the square," "playing the game." Any other scheme in business is pure folly. A slight profit, a temporary advantage may be gained by departing from the rules, but a man who undersells when he promises that he will not, or associates suppose him to be taking only one profit, is bound straight for the rocks. He is surrendering not only his character for honesty, but is violating the recognized laws of business,—commonly expressed as "experience."

Sortly before his death, J. P. Morgan testified that to one man he would loan a million on his bare word, while to another he would not loan a cent on any kind of collateral. This is nothing but a picturesque way of describing the way in which experienced business men regard each other; the way in which they regard each other based upon the "experience" which they and their forefathers have gathered and formulated into the laws of business.

Nothing is more certain in business than that the profit is based upon the cost of doing business. The jobber's cost is low; the retailer's cost is high, relatively. Does it sound rational that either a jobber or a retailer should demand both of these profits when the great mass of his fellows are content with only one of them? Not only is it irrational but because it is irrational it will become impossible. Automatically without much, if any, effort on the part of the individual, jobbing and retailing will settle down together like the lion and the lamb—side by side, gentlemen, and not one of them inside the other.

In closing, may I thank you for your attention and for the privilege of having been permitted to address you. And may I ask you this riddle?

> **"If the Shoemaker should stick to his last,**
> **what should the Jobber do?"**

Quick "Make" and "Break" Switch

J. H. Tucker & Company of Birmingham, England, are placing a new tumbler switch on the market. It is identical in size and external appearance with the flat type tumbler switch, but possesses the advantages of both a quick "make" and "break," whereas the old type had simply a quick "break." The company state that large quantities of these switches have been used during the past four years by various departments of the government, but that, having now finished all contracts in that direction, the switch is offered to the trade for general lighting purposes.

Here's a Christmas Present for You

YOUR WINDOW DISPLAY IS YOUR BEST SALESMAN

Between now and Christmas the Electrical-Dealers of Canada will be putting forth their best efforts to attract the holiday trade and some fine window displays will be shown.

The biggest problem before the electrical industry to-day is not engineering or manufacturing—the real problem is "merchandising."

We believe that well dressed windows—goods properly and tastefully displayed and demonstrated—are the most effective means of increasing the sale of electrical appliances.

With a view to encouraging the art of window dressing among electrical contractor-dealers, and, also, having in mind the value of the interchange of good merchandising ideas, the Electrical News offers four prizes for best dressed windows, under the following conditions:

(1)	First prize	$35.00
	Second prize	20.00
	Third prize	10.00
	Fourth prize	5.00

(2) The contest is open to any electrical contractor-dealer, municipality or central station in Canada.

(3) Photographs of window displays must be in our hands by December 31, 1919.

(4) Explanatory notes up to 100 words may be submitted with each photograph.

(5) The merits of the photographs will be judged by an impartial committee of three—one manufacturer, one jobber, one contractor-dealer.

Plan now to enter the competition. You have an even chance to win a prize. In addition to that, however, it is a dead certainty that your effort to produce a better window display will be reflected in your more abundant Christmas trade.

Address photographs and all communications:

"Best Window" Contest,
Electrical News,
347 Adelaide St. W., Toronto.

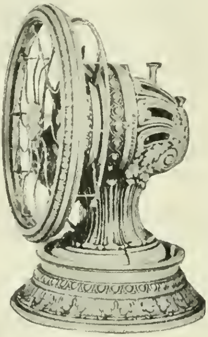
What is New in Electrical Equipment

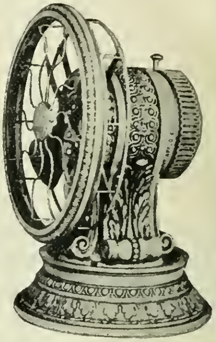
Fans de Luxe

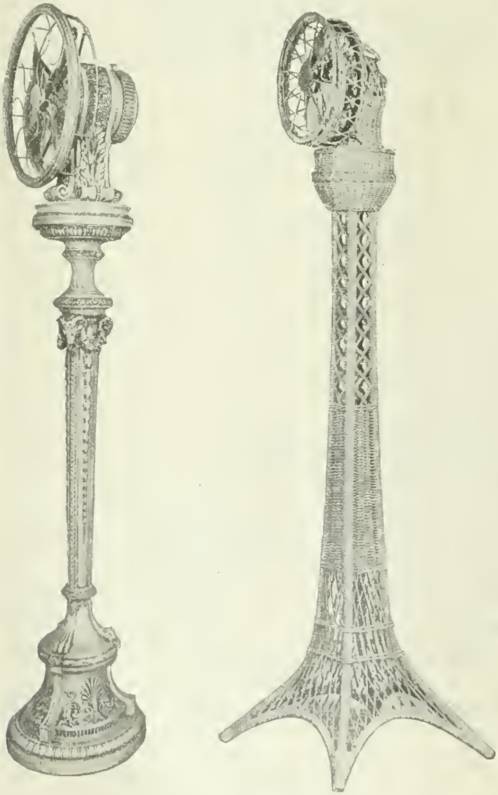
Heretofore the electric fan has been designed solely for utility, and, though the better grades have graceful lines and fine finishes, all makes have been kept plain and devoid of ornamentation. This simplicity is suitable for the great majority of purposes for which the fan is used, but there is said to be a growing demand for fans that will harmonize with the handsome furnishings of hotels, clubs, theatres, offices, and private residences.

To enable architects and interior decorators to obtain fans that will carry out any desired scheme of decoration, L. Plaut & Company, New York, have brought out a de luxe line of fans, consisting of 10, 12, and 16-inch oscillating fans of Westinghouse make encased in ornamental compo, finished by the company's skillful artists in any desired manner.

A comprehensive series of standard designs, covering recognized periods, has been produced but special designs to suit any original decorative plan can be readily produced. Standard finishes are French-gold, French-grey, and old ivory but any other colors, including polychrome, can be supplied. In addition to the compo covered fans there is also a novel and attractive line with decorative reed coverings, which strike a distinctive note of coolness and informality. The fans are supplied for desk, table, and bracket mounting but their effectiveness is enhanced by mounting them on columns or standards of wood, ornamented with compo, or of reed, which have been designed by the Plaut company to harmonize with the fans. These standards are wired and have a plug at the top to which the fan is connected. The fan can therefore be easily removed as desired and a lamp, plant, or other object put in its place.



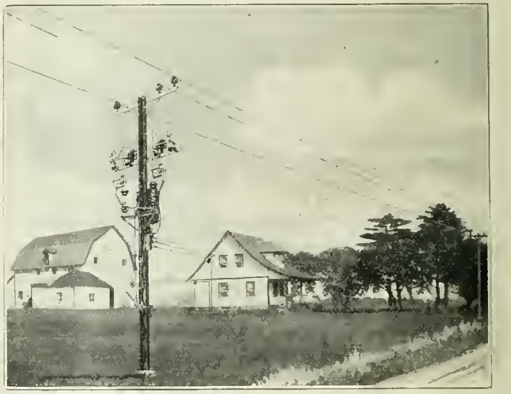




Examples of De Luxe line of Westinghouse Fans

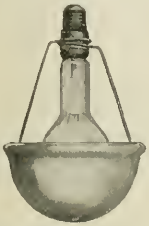
Serving Farmers from High Tension Lines

The rapidly increasing demand for farm service has developed the need for a complete switching, fusing, choke coil and lightning arrester unit, which can be installed near the farmers' premises. The new unit type equipment developed by the Delta-Star Electric Company, Chicago, is claimed to meet the imposed condition and, furthermore, can be installed at a reasonable cost. The two pole switch is operated from ground level and, in case of fuse operation, replacement can be safely made by the farmer. Either steel or wood pole mounting can be employed, depending upon the local conditions or desired investment. This new unit should be of material assistance to those utilities so situated that farm loads can be served.



The Eye-Shield Diffuser

The tendency in commercial and industrial lighting for the last few years has been toward lamps of higher efficiency as a means of securing better illumination in offices, shops and factories. Such lamps as the modern tungsten and nitrogen (gas filled) are of recognized economic value. Wherever a study of the lighting problem has been made, it has been found that speedier work and a better quality of workmanship is the result of increased lighting efficiency. The modern lighting problem, however, is not satisfied with increased light intensities alone. Direct illumination, which concentrates the rays in an extremely intense flood of light or spot light effect, is very confusing to the eye over the field of vision. The ideal light is one in which the high intrinsic rays of the modern high efficiency lamps are shielded from the eye, at the same time preserving their high efficiency.



That is the basis upon which the Luminous Specialty Co. state they proceeded in evolving the eye-shield diffuser, shown herewith. In this diffuser the translucent bowl is very thin, having an absorption of about 7½ per cent. The reflector, being semi-translucent, throws a soft diffusion of light over the upper area to be illuminated, gradually blending to its greatest volume on the working plane. This offers to the eye no sharp contrasts of lights and shadows. The absence of glare is most desirable and congenial to the eye; relieving eye-strain altogether and at the same time securing the greatest volume of useful light of low intensity on the plane to be illuminated.

The eye-shield diffuser is made for use with all forms of tungsten and type "C" lamps up to and including 200 watts. It can be installed in any fixture now used or in and fixture in which the type "C" or gas-filled lamps can be installed. A combination plug and socket is provided which fits the socket in the fixture. A wire holder supports the diffuser. This diffuser is used at all points where more efficient illumination is required, but is particularly adapted for commercial and industrial work, and particularly in schools where the utmost consideration should be given to conservation of the eye. It is being distributed throughout Eastern Canada by The Perkins Electric Company of Montreal, Toronto and Winnipeg.

The Hoover a Three-in-One Cleaner

The Hoover Electric Suction Sweeper is now being made in Hamilton, Canada, in a factory which affords the manufacturer some 30,000 square feet of floor area at the outset, with provision for double this area when demand develops. The Hoover is well known in Canada already, but will be thoroughly advertised throughout the coming year so as to make its sale by the contractor-dealer little more than a matter of display. It is claimed that its popularity depends largely on the fact that it is three cleaners in one: an electric carpet beater, an electric carpet sweeper and an electric vacuum cleaner.

The Amco Illuminet

The Amco Illuminet, illustrated herewith, is a new lighting fixture which is claimed to combine all the latest improvements in industrial and commercial lighting in a small unit which may be applied to the fixtures installed in the home. To the ordinary socket is simply added a spun-holder, a porcelain enamelled steel reflector and a specially designed and carefully calculated diffusing squat shade. This unit makes it possible for the housewife who wishes to materially improve her illumination to do so without going to the expense of entire new fixtures. The present holders and lamps may be removed and the Amco Illuminet just pushed on to the socket. A stock of illuminets is carried by the Masco Company, Toronto.

The city of Saskatoon, Sask., recently advertised for sale by tender a 26 x 48 vertical cross compound engine direct connected to a 750 kw., 2 phase, 2,300 volt, 60 cycle generator, complete, with surface condenser, air pump, etc. This equipment is to be replaced by new machinery of larger capacity.

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GET

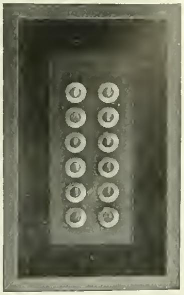
HURT

TO-DAY

A poster issued by the Ontario Safety League. Its effectiveness is in its simplicity

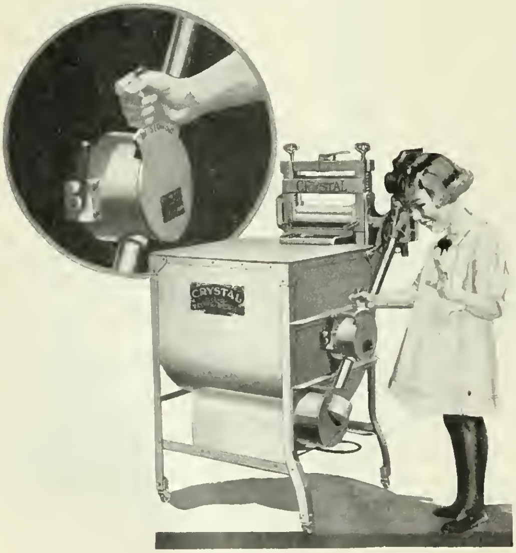
A New Safety Push Button Panel

In order to provide a safety lighting panel of small capacity for apartment houses, residences, etc., the Westinghouse Electric & Manufacturing Company has recently put on the market its type "C" safety panel. These panels are made up of push buttons and plug fuses, and all parts accessible are electrically dead so that the operator is in no danger of getting a shock in turning the lights on or off. Each pair of buttons with the fuses constitutes a unit, and should a switch become damaged all that is necessary is to remove the switch cover section and unscrew the defective part, without disconnecting any wires, exposing other switches, or removing the panel from the box. By reason of its construction, this panel is the narrowest safety panel on the market, and the only one of its capacity that can be furnished with a safety-type main switch if desired. These panels are made for two or three wire systems, and for from two to thirty-two branch circuits. The capacity of the main ranges from 30 to 200 amperes, 125 volts, and the capacity of each branch circuit is 10 amperes.



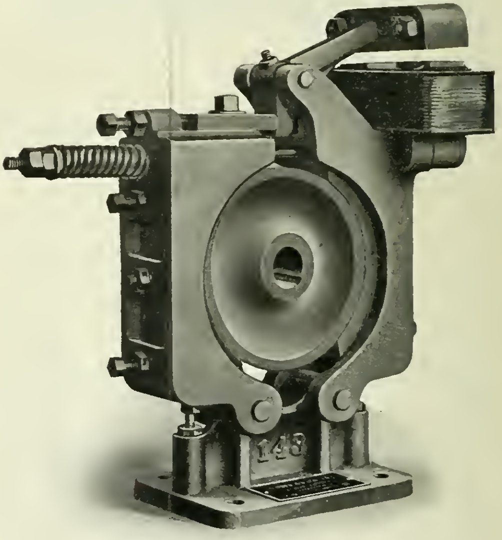
The Crystal Washing Machine

The Crystal Washing Machine illustrated herewith, is being distributed in Canada by the Onward Manufacturing Co. of Kitchener, Ont. The Crystal forces the water, steam, rich suds and air through the meshes of the cloth, cleansing the coarsest or the finest of fabrics without rubbing or injuring of any kind. The cylinder drives in only one direction, making it easy to maintain a speed which removes the dirt without resorting to complicated mechanical parts found in less efficient machines. Only 15 minutes is required to wash each cylinder full of clothing. The swinging mechanism on this machine makes it easy to put the wringer in three positions; the clothes may be wrung from the machine into the rinse water, from the rinse water into the blueing water and from the blueing water into the clothes basket. It is not necessary to move the washer itself, as the wringer swings freely into position wherever and whenever it is needed. Special features of this machine are the automatic safety friction release which protects the machine when overloaded; the safety wringer release which releases wringer instantly in an emergency; and all moving parts are covered, making it impossible to get caught in the mechanism.



Magnetic Brake for Small A. C. Motors

The cut herewith represents a new type of magnetic brake that has been designed by The Volta Manufacturing Company, Limited, of Welland, Ont. This brake is designed specially for small a.c. motors up to 7½ h.p. These brakes have been thoroughly tested and all that have been put into service are giving absolute satisfaction. This new type of magnetic brake has many points of advantage over the old type. Note the simple and rugged construction; the absence of toggle joints and wearing parts; the minimum space required and the simple manner in which adjustments can be made.



Davis Slate and Manufacturing Co.

Davis Slate & Manufacturing Company of Canada, Ltd., announce that their sales office is now located at their Toronto factory Shaftesbury and Summerhill Aves.

It is reported that a committee of the London County Council officials has been appointed to confer with the Illuminating Engineering Society to consider the question of eye strain in connection with movie pictures.

Current News and Notes

Almonte, Ont.

The ratepayers of Almonte, Ont., will vote on the question of acquiring the power plant of the Wylie Power Company.

Bathurst, N. B.

The Bathurst Lumber Company are installing a hydro-electric plant at Grand Falls, about 25 miles from Bathurst, N. B. Orders have been placed covering two 4,000 kv.a. generators with necessary transformers exciters and control for this installation. Power will be transmitted to Bathurst and there distributed to their various pulp and lumber mills Professor Herdt, Montreal, is the consulting engineer.

Chatham, Ont.

The Chatham, Wallaceburg and Lake Erie Railroad is now intsalling new equipment necessary for the use of Hydro-electric power. Some of this equipment was purchased from the London and Lake Erie Railway, and the balance from the Canadian Westinghouse Company.

Cornwall, Ont.

The ratepayers of Cornwall, Ont., will vote, on December 19th, on the question of extending the franchise of the Stormont Electric Light and Power Company, Limited.

Edmundston, N. B.

The town of Edmundston is making extensive additions to its electric power plant and system. A new generator and larger transformers are being installed and the distribution system extended to connect up some 200 new customers. The starting up of pulp mills has caused this rather unusual boom.

A company is now being formed to develop a Hydro-electric plant on Green River, about six mlies from the town of Edmundston, N.B. It is proposed to install about 1500 kw. and transmit power principally for distribution in the State of Maine. Dr. Guy is the promoter of this development and Mr. C. Brandeis, Montreal, is the consulting engineer.

Gilbert Plains, Man.

A by-law will be submitted on December 16th to the ratepayers of Gilbert Plains, Man., on the question of installing an electric lighting plant. The town council are interested in quotations for equipment.

Gleichen, Alta.

Work has commenced on the erection of a power house at Gleichen, Alta., for the provincial government. C. C. Potter and Company, Medicine Hat, are the general contractors.

Guelph, Ont.

The ratepayers of Guelph, Ont., will vote at the January elections on the Hydro Radial by-law.

The board of light and heat commissioners, Guelph, Ont., have received notice from the Hydro-electric Power Commission limiting their power load to 3200 h.p. from 7 a.m. to 6 p.m. and to 2630 h.p. from 6 p.m. to 6 a.m.

The Guelph, Ont., Board of Light and Heat Commissioners are trying the system of having customers read their own meters. Forms, instructions and stamped envelope are furnished each customer who is asked to return the reading by a certain specified date.

Halifax, N. S.

The Nova Scotia Tramways & Power Company are making extensive improvements to their equipment. The entire distribution system has been rebuilt and feeder regulators installed. They are rebuilding most of the railway system and installing new and heavier rails. Fifteen one-man safety cars have been ordered and will be put in service immediately. This company is now controlled by the Stone & Webster Corporation of Boston.

Hamilton, Ont.

It is reported that the Walker Electric Company, Hamilton, Ont., have sold out.

The Tallman Brass & Metal Company, Hamilton, Ont., have purchased 14 acres of land on Burlington Street, south of Stipes Inlet, to take care of necessary extensions to their plant.

Hanley, Sask.

The proposed installation of a lighting system at Hanley, Sask., has been postponed until Spring awaiting the approval of the provincial government.

Joggins, N. S.

The Maritime Coal, Railway & Power Company, Joggins, N.S., are planning the installation of an additional two 1000 kw. steam turbines with necessary auxiliaries. Mr. Sammett, Montreal, is consulting engineer employed by this company.

Kamsack, Sask.

A by-law has been passed by the ratepayers of Kamsack, Sask., authorizing the purchase of an auxiliary engine and extensions to the local lighting plant.

Kentville, N. S.

The Kentville Electric Light Commission will purchase current from the Nova Scotia Sanitorium and close their present steam plant. The Sanitorium is putting in all necessary transformers, etc., and supplying current at their switch board at a price of 4½ cents per kw.h. This arrangement will give the town a much needed day service. The Kentville Commission are also installing a modern series street lighting system.

London, Ont.

The Bell Telephone Company have started alterations to their London exchange, which will include an additional story on the building and the installation of considerable new equipment.

The Hydro-electric Power Commission of Ontario have reported to the city council of London, Ont., that it would not be advisable to entertain the purchase of the London Street Railway as, in their opinion, it could not be operated as cheaply as the company is now doing.

Moncton, N. B.

The city of Moncton, N. B., is considering the purchase of the entire light, power and tramway of the Moncton Tramway and Power Company. If this deal goes through the city will install a modern power plant as the present outfit is overloaded. John Edington is city engineer of Moncton.

New Glasgow, N. B.

The Nova Scotia Steel Company have recently purchased the plant of the Acadia Coal Company at Stellerton. This latter company has a most complete and extensive electric power plant and it is probable that the Nova Scotia Steel Company will transmit some 4,000 kw. from this plant to their works at Trenton, a distance of seven miles, and electrify their steel mills, which are now principally operated by steam.

New Liskeard, Ont.

It is reported that a power development plant is contemplated at Fort Metachewan, Ont. Sutcliffe & Neelands, New Liskeard, Ont., are named as engineers, and the capacity of the plant would be about 5,000 h.p.

Newmarket, Ont.

The ratepayers of Newmarket, Ont., will vote on a by-law authorizing the renewal of their contract with the Toronto and York Railway for the electric power supply of the town. The existing contract was signed in 1914 and, it is said, has proved very satisfactory.

New Westminster, B. C.

Mr. A. Rowell has opened an electrical contracting business in New Westminster, B.C., and will specialize in lighting installations and motor repairs. Mr. Rowell has been about 20 years in the electrical business, for some time being in charge of the electrical work at the Poplar Island Shipyards and also with the British Columbia Electric Railway Company.

Niagara Falls, Ont.

Fire on December 10th completely gutted the local car barns of the Niagara, St. Catharines and Toronto Street Railway, destroying also two of the newest type cars and a snowplough. The loss is estimated at $40,000. Power is being supplied by the International Railway Co. until the local power house can be put into commission again.

Ottawa, Ont.

Another step in the negotiations between Canada and the United States for navigation and power development on the St. Lawrence, west of Montreal, has been taken in the completion of a series of questions to be submitted to the International Waterways Commission. These have been prepared and agreed upon by Col. Keeler, representing the United States, and W. J. Steward, Dominion hydrographer. These questions cover the claims of both countries in power to be developed and navigation channels improved, as well as the responsibilities of each for cost, maintenance and damages.

Penhold, Alta.

An electric lighting plant is being installed at Penhold, Alta.

Peterboro, Ont.

At a meeting of the Peterboro branch of the Engineering Institute of Canada on December 7, Mr. W. H. Smith, of Belleville, superintendent of the Central Ontario System of the Hydro-electric Power Commission, assisted by Mr. G. Blackwell, gave an address outlining the development of the Central Ontario System.

St. Thomas, Ont.

The debenture by-law for the purchase of the London & Lake Erie Traction Company's property in St. Thomas at $25,000 was carried by a vote of 475 to 37. The purchase includes the brick barns, power house, overhead wiring on Talbot Street and land along the M. C. R. property.

Tara, Ont.

The ratepayers of Tara, Ont., will vote on a Hydro enabling by-law at the January elections.

Toronto, Ont.

Announcement has been made by the Hydro-electric Power Commission of Ontario of a plan whereby pensions and sick benefits will be provided for employees. Details of the plan are now being completed.

The board of control, Toronto, has instructed the Works Commissioner to proceed with extensions to the line and equipment of the Bloor Street West civic car system at a cost of $160,000.

Customers of the Toronto Hydro-electric System have ben notified that , beginning January 1, the discount on a.c. power bills will be cut from 20 to 10 per cent. Lighting and household bills will not be changed.

Windsor, Ont.

Extensions of the telephone system serving the border municipalities are being planned at a cost of $200,000. Improvements will include erection of a new exchange at Walkerville to serve the district east of Langlois Avenue. Cables in conduits will replace overhead wires in many sections and Wyandotte and London Streets will be entirely cleared of poles. Walkerville exchange will be built in the Spring.

Personals

Mr. N. S. Marsh, of Fort Frances, Ont., has been appointed Hydro-electric inspector with jurisdiction over Fort Frances and surrounding district.

Sir Adam Beck sailed for England on Dec. 13th to visit Lady Beck, who is said to be critically ill. He expects to be absent until about the middle of January.

Mr. L. J. Barry, formerly with the Seymour Light & Power Company, has taken over the management of the electrical department of Allen General Supplies, Limited.

Mr. J. D. Black, for sixteen years with the Fredericton "Gleaner," has been appointed to organize a publicity department for the New Brunswick Telephone Company. This new department will seek to improve the relations between the company, its employees and subscribers.

Mr. Alexander McDonald, of Montreal, has been appointed traffic superintendent of the Winnipeg Electric Railway System, succeeding R. R. Knox, who has been made assistant to the general manager. Mr. McDonald has been connected with the Montreal Tramways Company since 1887, and for the past eight years has been in charge of one of the important traffic divisions of the Montreal system.

Capt. W. S. Montefiore, M.C., is now a partner in Spielman Agencies, Montreal. Capt. Montefiore was associated with this firm before he went overseas, early in 1915. In the meantime he has been with the Imperial Army on the Westernt front, Egypt and Palestine. Capt. Montefiore has recently returned from England and reports that although conditions are by no means normal, the firms his company represents are in a much improved position for making deliveries, and that several large shipments from their principals are now on the way.

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